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A Scheduling Model for the Aerial Relay System

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1. INTRODUCTION

The growth of air travel in the United States during the last 40 years has been caused by a fusion of technology and economics. Aircraft design improvements, resulting in higher speed and larger size, have increased the efficiency and productivity of airplanes. Airlines have passed on these savings to the public through ever-lower ticket prices. At the same time, the U.S. economy has had substantial growth in per capita GNP (and per capita disposable income), thus compounding the consumer's ability to purchase travel. One million passengers flew in the U.S. in 1938; 240 million flew in 1978.

As travel grew, the infrastructure grew with it. Old airports expanded and new airfields and terminals were built; the air traffic control system was modernized to keep pace with the jets; airlines took advantage of the computer and communications explosions and adapted them to their own needs.

But eventually air travel created its own set of problems. Increased operations of jets caused the once-curious and proud residents near airports to clamor for relief from incessant noise. Improved engines and a leveling of operations due to the introduction of wide-body aircraft have abated complaints somewhat, but any plans for airport expansion are automatically resisted. Similarly, unless airports are placed far away from population areas (Kansas City, Mirabelle, Fort Worth-Dallas) and contain sufficient acreage to effectively hide the noise within the airport boundaries, they will not be built.

Thus, capacity at large hubs is running out and no relief seems possible through airport expansion due to political and environmental reasons. With rapidly rising fuel costs, congestion at airports is also diminishing the productivity gains of fuel-efficient aircraft and causing the price of air travel to increase. Future technological innovations (metering and spacing of aircraft, wake vortex reduction, etc.) promise to increase airport capacity. However, the gambit of substituting ever-larger aircraft for smaller ones will eventually transfer the congestion to the ground side of the airport (already Los Angeles International Airport prefers to have a wide-body operation replaced by a narrow-body

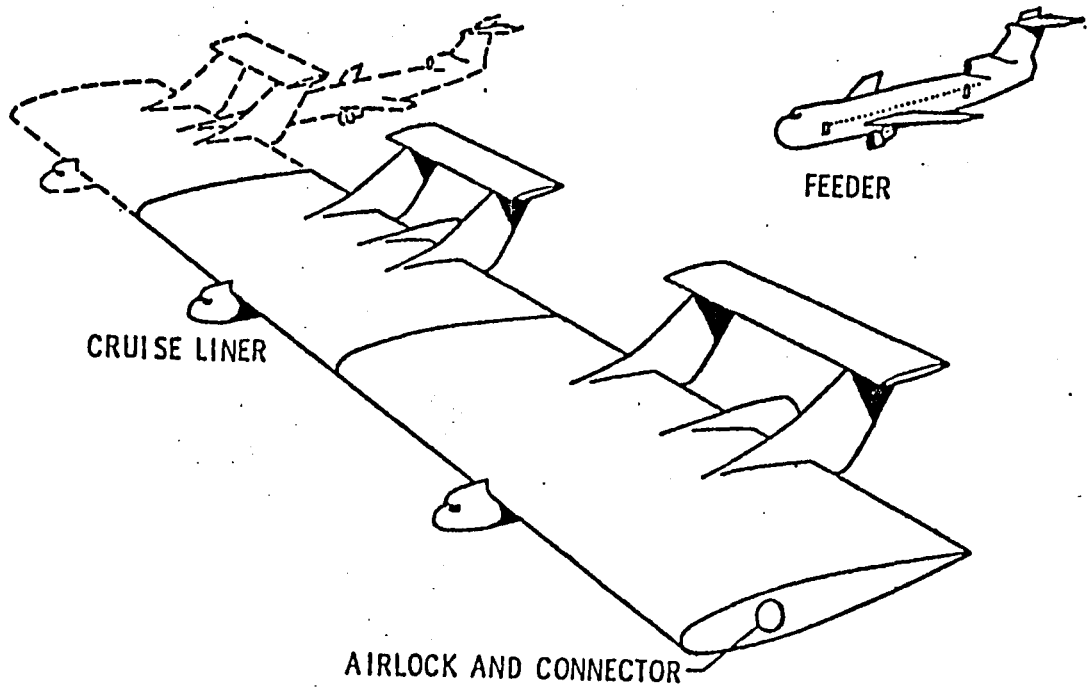
because of access problems). Thus, if the system of air transportation remains as currently constituted, further growth in air travel will be stymied by a combination of energy (costs and availability) and congestion (air and land) in the not-too-distant future.

Such considerations have led some observers of the aviation scene to conclude that the air transportation mode is simply maturing, just as other transportation modes have in the past. Other analysts, more optimistically, note that some fundamental changes to the existing system of transporting people and cargo by air could allow growth to continue. One of the more imaginative and radical departures is the Aerial Relay System (Kyser, 1979).

Briefly, in the Aerial Relay System a series of "liners", made up of "liner modules", continuously cruise over the United States at a set altitude and on a predetermined schedule. These liners are met by a fleet of "feeders" carrying aloft passengers bound for cities along the liners' routes and accepting passengers destined for their own base. The basic elements of the system are shown in Figure 1. A fully-developed Relay system could provide frequent non-stop service between practically any two cities in the United States.

The advantages of the Relay system are many. The elements of the system can be tailored for their own function leading to efficiency of operation: the liners for cruise conditions; the feeders optimized for short haul take-off and climb. But the basic attraction lies in the Relay system's ability to unload the major hubs' airports by utilizing secondary (or satellite) airports and smaller city airports for the feeders' operations; since one of the major functions of airports, especially those at large hubs, is the interchange of connecting passengers between airplanes, this transfer is now performed onboard the liners. The feeder from a smaller city or secondary airport takes up passengers bound for many destinations downstream (and accepts diverse passengers for the downward journey) bypassing the hub and relieving the hub of these operations. The Relay system would thus supplement and not replace the existing airline networks; the hub-to-hub origin-destination (O-D) traffic could continue to be served by dedicated aircraft at the major airports. Alternatively,

Figure 1. Aerial Relay System Elements: Liner and Feeder Aircraft



the Relay system could serve as the major O-D link between large hubs while utilizing satellite airports and thus relieving the major airports of this type of traffic.

Thus the Aerial Relay System has intrinsic appeal, as it could both relieve congestion and decrease energy consumption while allowing continued growth by the air mode. Clearly, substantial engineering and design work is required before the system can be implemented. However, some questions regarding its operational feasibility can be addressed to insure that there are no fundamental drawbacks to the general concept. The scheduling of liners, i.e. the ability to calculate their position during the course of the day, and the estimation of the passenger flow in response to this service, is one such consideration. This report describes an interactive computer scheduling model to perform these functions for the Aerial Relay System.*

* The authors wish to acknowledge the support and direction provided by Mr. Albert C. Kyser of the NASA Langley Research Center. His infectious enthusiasm is surely without parallel.

2. THE SCHEDULING MODEL: ASSUMPTIONS AND CONSIDERATIONS

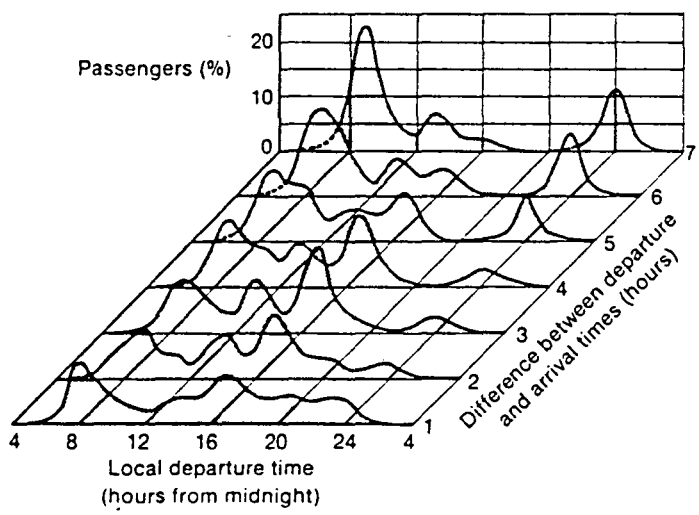
To determine the adequacy of the Aerial Relay System in providing a new air service to the population of the United States, an estimate of the potential demand for the service is required. However, the passenger demand for the Relay system is unknown, since it will depend on such factors as cost of the service, perceived travel time, frequency of service, alternative transportation means (both air and ground), improvements in telecommunications by the time the Relay system is introduced, perceived safety of the system, and overall travel demand levels.

Given these uncertainties, the development of the model focused on maintaining maximum programming flexibility. To investigate alternative scenarios, it is possible to alter, within the model, all the system variables such as the route structure, the number of cities in the system, the liner speed, and the magnitude of the passenger demand for each city pair. Once these basic system variables are defined, the program is designed to run in an interactive mode, with the user determining such operational parameters as number and size of liners, critical load factors, etc.

The core of the scheduling model contains three fixed sets of algorithms. One is a method of determining the demand for each city pair, as a function of time of day. The second is a technique of allocating this potential demand to a specific flight. The third is an algorithm to compute the resulting traffic flow over each link of the Relay system. These sub-models are assumed to adequately reflect traveler behavior at the time when the Relay system can be implemented.

One such passenger pattern is the time-of-day demand relationship. This has been found to be related most directly to the difference between local departure and local arrival time. The passenger, when choosing his flights, takes both times into account; the elapsed time appears to be not as important as the convenience at both ends of the trip. Boeing, for example (Pina, 1980) has derived time-of-day curves from airline load data for a range of markets (Figure 2). For the Relay system a mathematical model developed by Eriksen (1978) which takes into account departure and arrival time preferences is used which provides similar demand distributions (see Appendix A). It should be recognized that it may be possible to adjust the peaks and valleys of these distributions by various peak and off-peak pricing schemes.

Figure 2. Time-of-Day Demand



Source: Pina (1980).

Once the time-of-day demand for each city-pair is estimated, these passengers must be allocated to specific flights. The allocation method in the Aerial Relay System model uses a "desirability function" described by Elias (1979)(see Appendix B). Basically, the passenger traffic desiring departure at a certain time is split among the flights leaving before and after the desired departure time on the basis of the time difference between desired and available departure times. By allocating passengers to flights according to the closeness of the flight time to their desired departure time, this model is more realistic than one which assigns passengers on a fifty-fifty basis, evenly spaced around scheduled flight times. This method also creates peaking problems for certain preferred flights, accurately reflecting real airline operations.

The details of the computation of traffic flows over the city-pair links and at the enroute cities are given in Appendix D, a complete description and computer listing of the Aerial Relay Scheduling Model, as applied to a transcontinental case study discussed in Section 3.

3. A TRANSCONTINENTAL CASE STUDY

One of the options envisioned for the Aerial Relay System is to provide an alternative travel means for those passengers from the large hubs of the United States who desire to visit other large hubs. In this scenario, the main airports at the large hubs would retain their role serving connecting passengers, while travelers living in these hubs would use reliever (secondary) airports at their cities to board the Aerial Relay System and travel to other large hub reliever airports. Since the feeder aircraft can be specifically designed to quickly and quietly deliver passengers to the liners, neighborhood opposition to the use of secondary airports for feeder operations would be minimal. This option would relieve the large hub airports of a substantial number of travelers, decreasing congestion in the air and on the ground.

To illustrate the behavior of the Aerial Relay System under reasonably realistic conditions, the general concepts of the Relay Scheduling Model were applied to a case study in which the Relay system served the origin-destination passengers of the large hubs lying on a transcontinental U.S. route. The route chosen is shown in Figure 3. Assuming a feeder range of 150 miles, this route can serve eleven hubs: San Francisco, Los Angeles, Denver, Chicago (plus Milwaukee), Detroit, Cleveland, Pittsburgh, Washington, D.C., Philadelphia, New York City and Boston.

Origin-Destination demand between these cities was obtained from the Civil Aeronautics Board's O-D ten percent sample (Civil Aeronautics Board, 1976). The average daily demand at each city is given in Appendix C. A summary of the passenger flow between the cities is shown in Figure 4.

The inter-city demand at the western end of the route (San Francisco-Los Angeles) was not included because of its large volume; the Relay system would be saturated on the Los Angeles-San Francisco link and travelers from many distant eastern cities would be denied boarding. The east coast cities, however, are postulated to be served by the Relay system to observe its operational feasibility in both short-haul and long-haul markets.

For simplicity, the schedule of the liners was designed so that each set of liners would perform two round trips per day; i.e., each flight departs from Boston to San Francisco-Los Angeles and returns 12 hours later,

bypassing San Francisco on its return segment. Thus each flight has 10 westbound segments and 9 eastbound segments in its itinerary. This requires a liner cruising speed Mach number of 0.76, which the Relay system could easily achieve.

For the transcontinental case study, six liners with a capacity of 3200 seats each (equal to 4 modules of 800 seats each) to depart at two-hour intervals from Boston were chosen. This one-way total seat capacity of 38,400 was enough to insure that the majority of the daily transcontinental O-D traffic would be adequately served, while at the same time peaking problems could be observed.

The results of the case study are summarized in Figures 5 through 10. These figures show the distribution of passengers on each liner over each segment of the Relay system as a function of the departure time of the liner from each hub. The overall load factor for this transcontinental Relay system is 26%. A histogram of the segment load factors shown in Figure 11 indicates the skewness of the distribution towards the lower end, with 33% of the legs having a load factor of less than 15%.

This skewness occurs because the liners are flying all night when very little demand exists. Figures 5 through 10 show that the late night and early morning seats on all the liners are largely unoccupied, especially for east coast night and early morning departures which arrive early in the morning on the west coast (Figures 5, 6, and 10). For eastbound traffic the late afternoon and early evening flights from the west coast arriving early the next morning show largely empty seats (Figures 5, 6, 7).

Thus the hypothesized Relay system is seen accommodating the traffic demand quite well, not exceeding 90% load factor on any segment during any time of day. However, the many largely-empty liners which fly over the United States during the late evening and early morning hours due to the non-stop nature of the Relay system would probably require additional demand stimulation to make the system self-supporting. Although the economics of the Relay system are unknown, off-peak pricing schemes featuring deep discounts would probably be necessary to generate this traffic. No other barriers to the feasibility of scheduling the Aerial Relay System appear to exist.

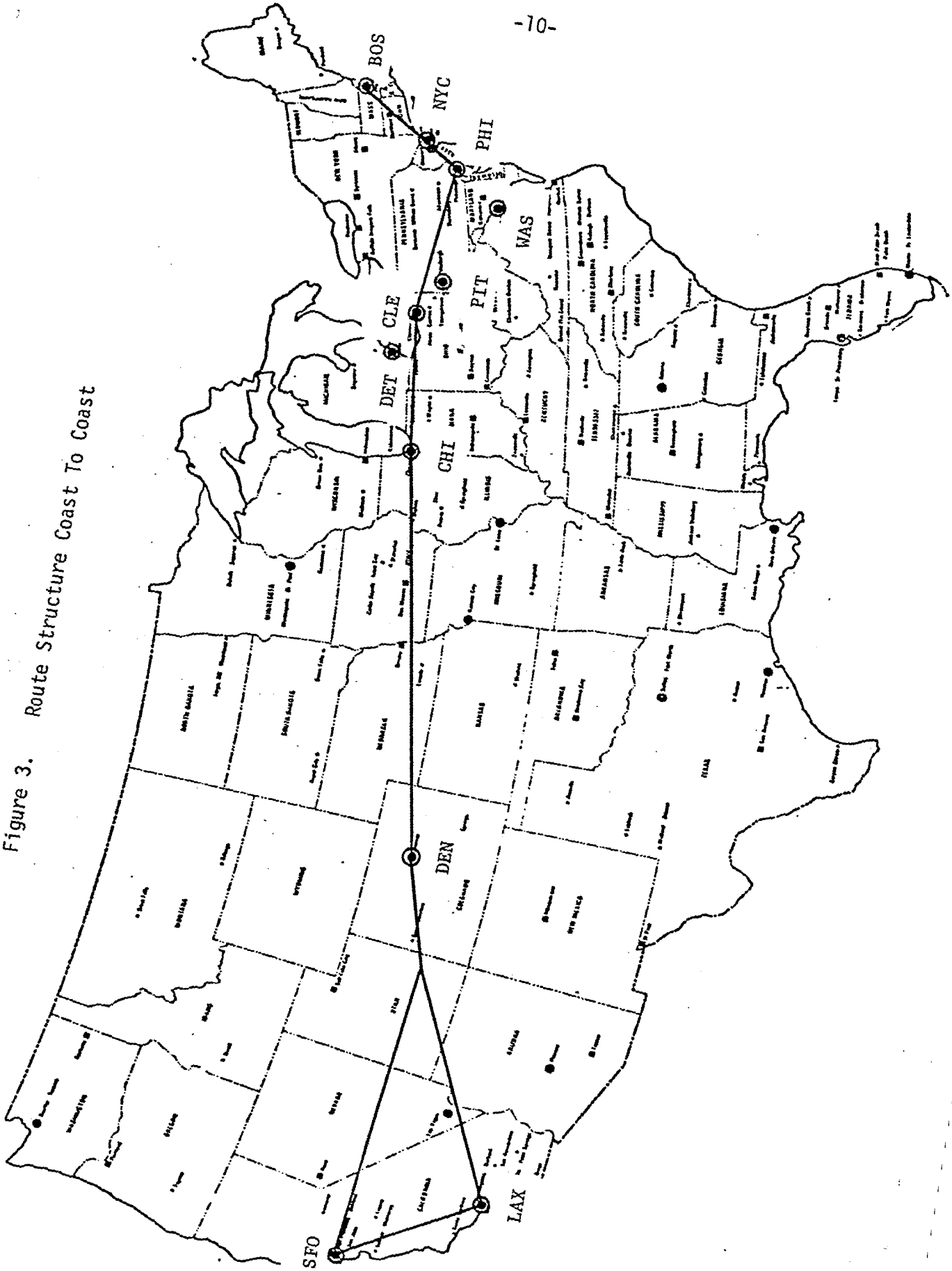


Figure 3. Route Structure Coast To Coast

Figure 4. Summary of City Pair On-line Passenger Flow

Los Angeles
San Francisco to Boston

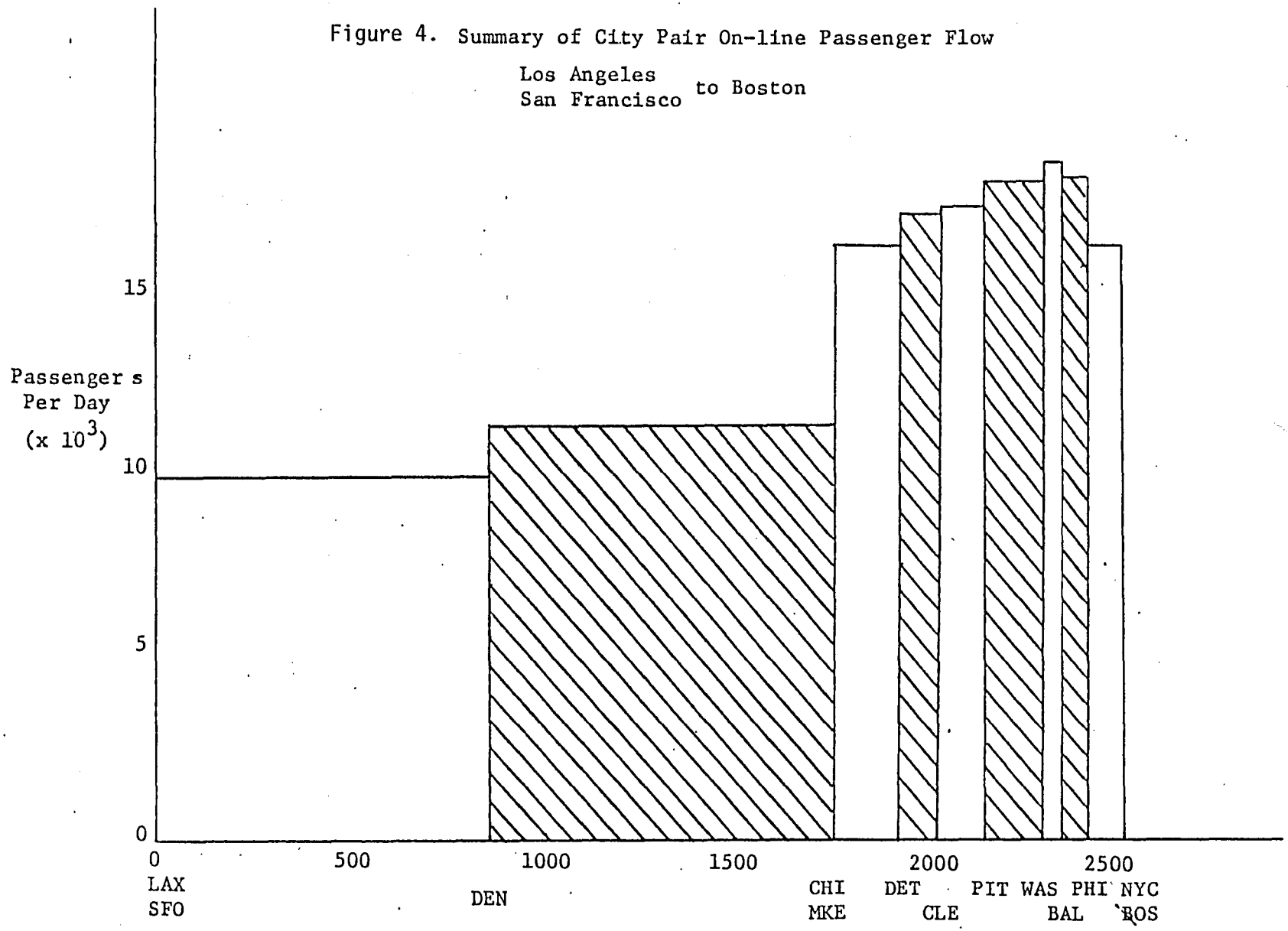


Figure 5. On-board Passenger Load Factor
Liner Number: 1
Departures Given in Local Time

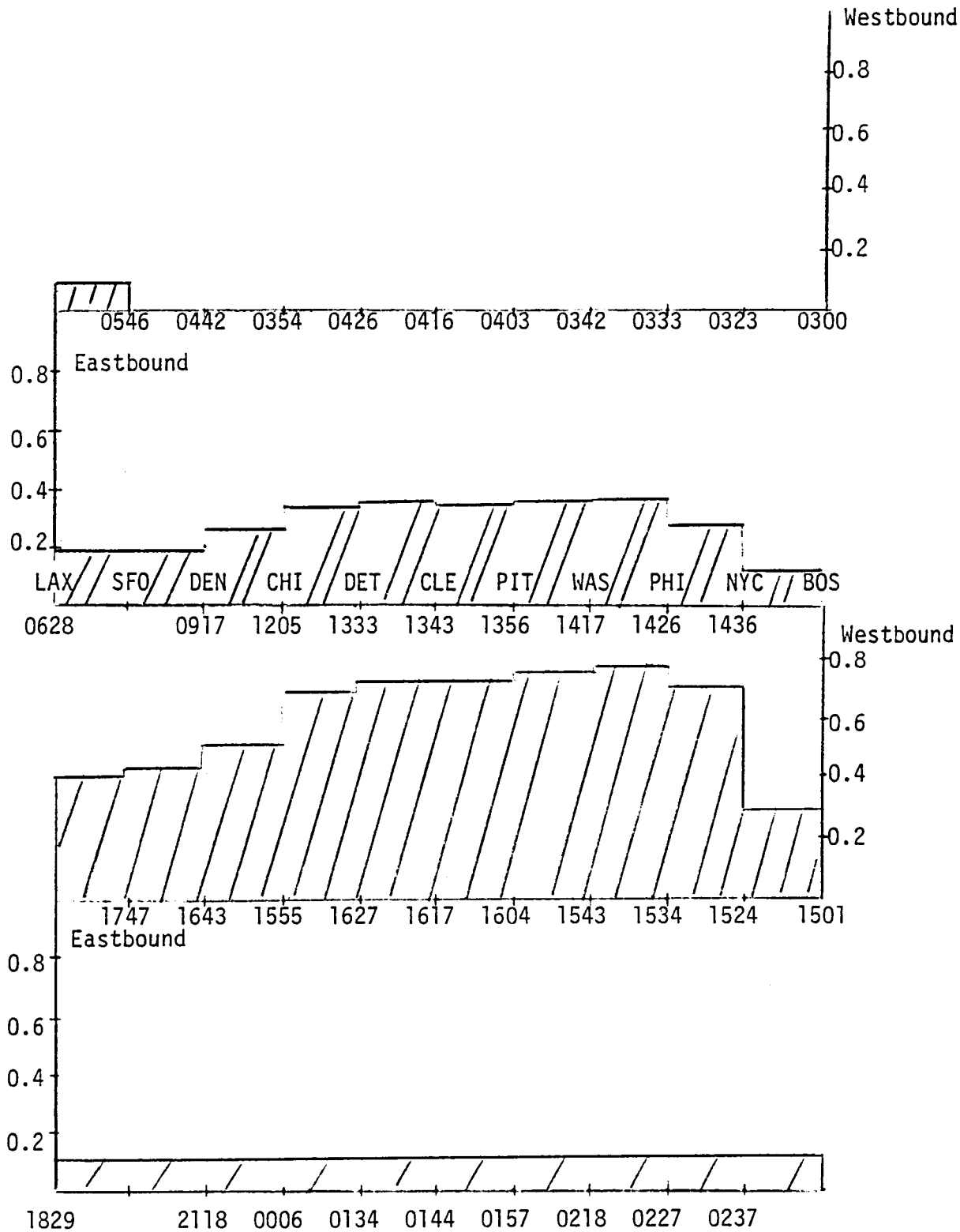


Figure 6. On-board Passenger Load Factor
Liner Number: 2
Departures Given in Local Time

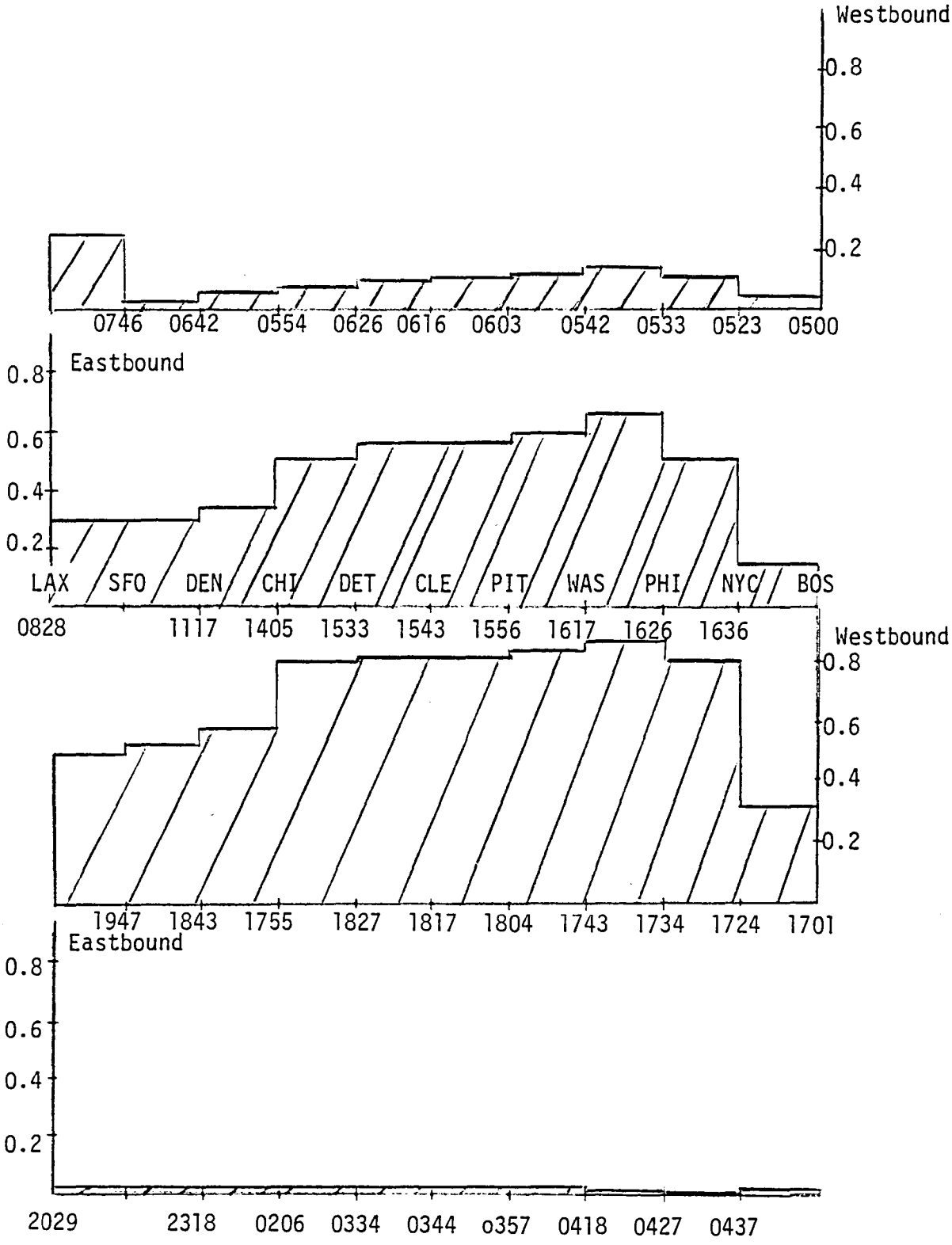


Figure 7 . On-board Passenger Load Factor

Liner Number:3

Departures Given in Local Time

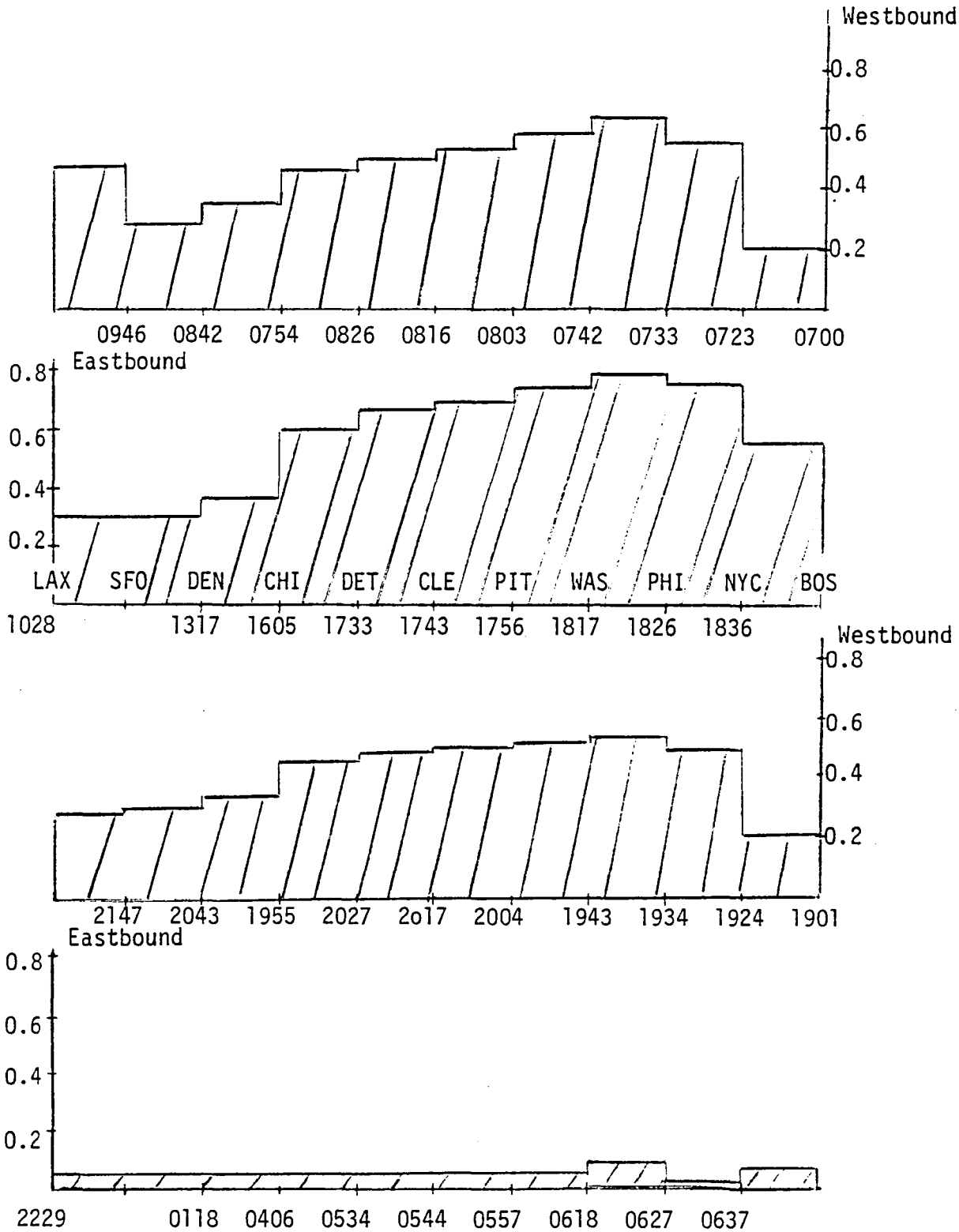


Figure 8. On-board Passenger Load Factor

Liner Number: 4

Departures Given in Local Time

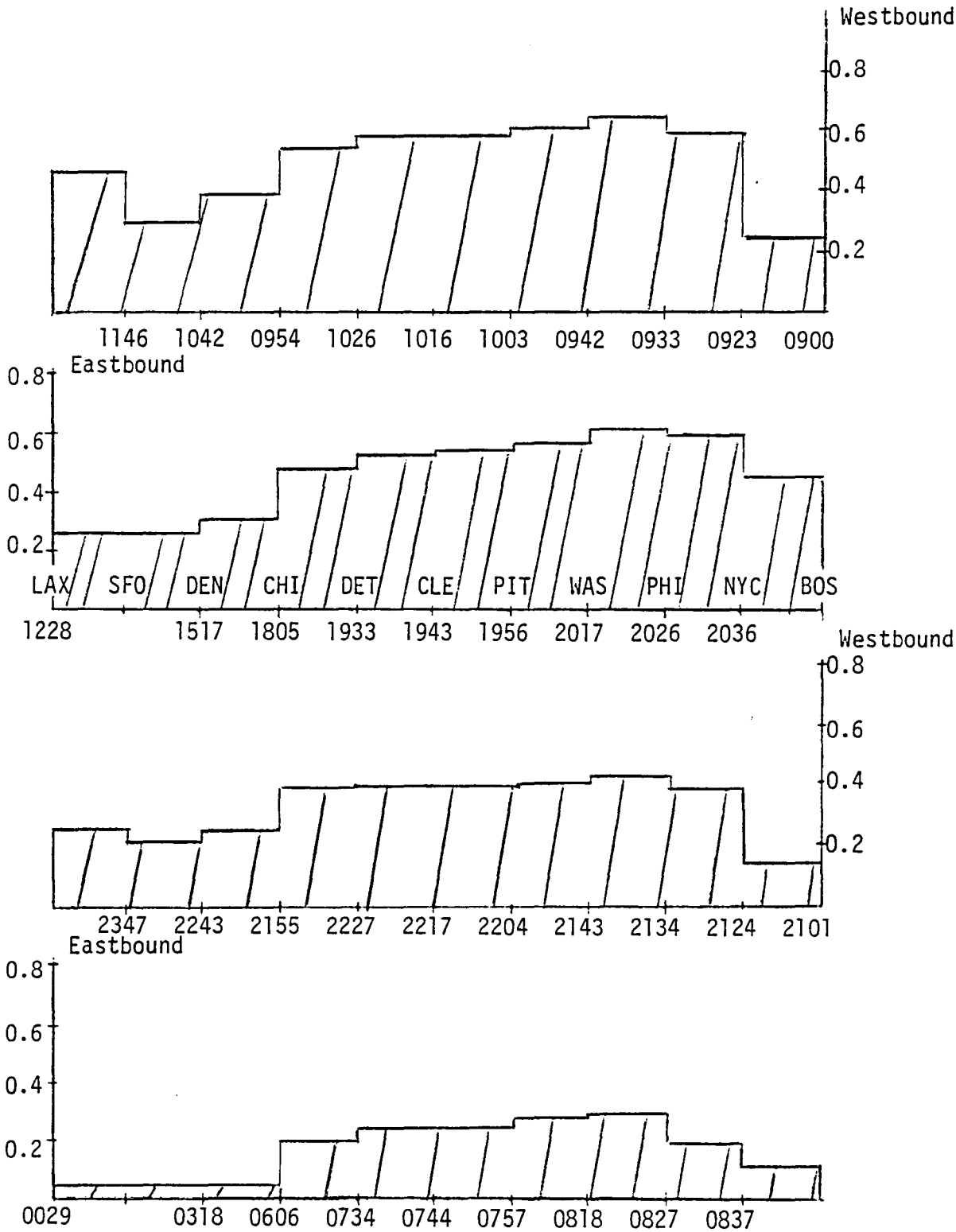


Figure 9 . On-board Passenger Load Factor

Liner Number: 5

Departures Given in Local Time

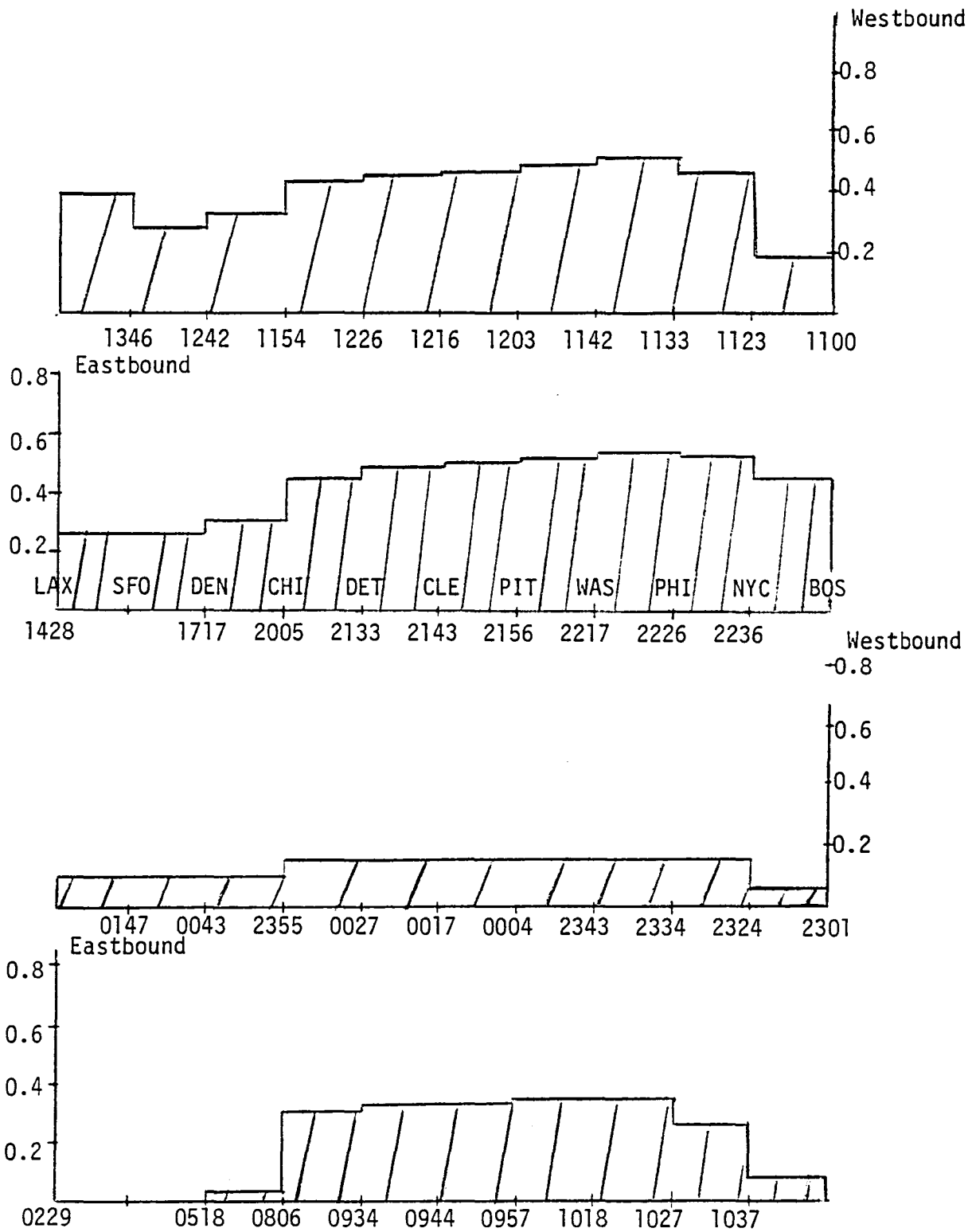


Figure 10. On-board Passenger Load Factor

Liner Number: 6

Departures Given in Local Time

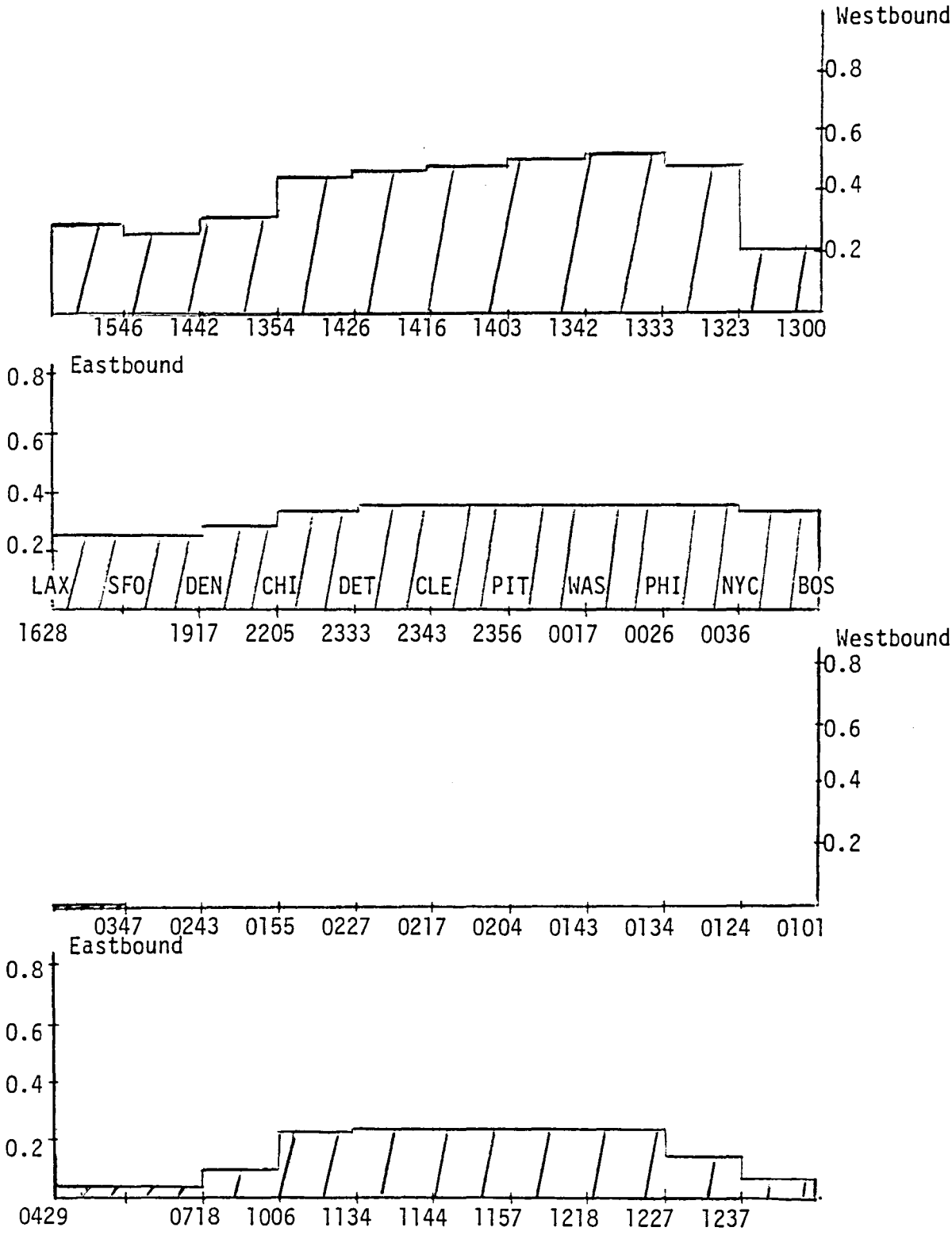
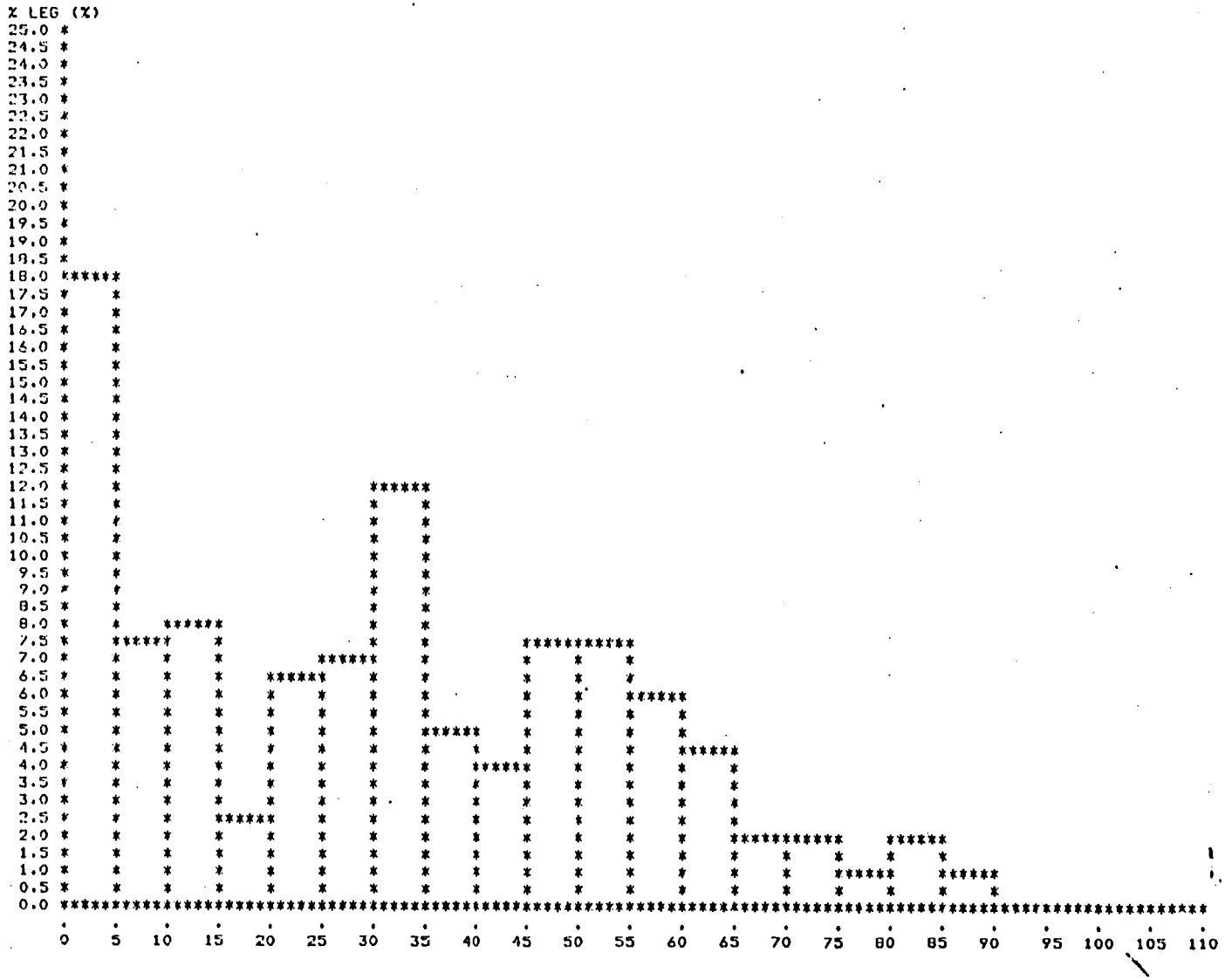


Figure 11.

HISTOGRAM OF LOAD FACTOR DISTRIBUTION



4. SUMMARY AND RECOMMENDATIONS

An interactive computer scheduling model for the Aerial Relay System has been developed to explore some questions regarding the operational feasibility of the concept. A case study involving the origin-destination traffic along the large hubs lying on a transcontinental route of the United States was analyzed using the model to assess the performance of the system under one possible scenario.

The results of the case study indicated that the Relay system could accommodate this type of traffic demand, but that a large portion of the fleet was underutilized during the late evening and early morning hours due to the continuous nature of the Relay system. A number of possibilities can be explored to increase traffic during this period, the most obvious being off-peak pricing schemes to attract more passengers. (The potential for air cargo during these periods also exists, but has not been addressed in this study.) It is recommended that the scheduling model be modified to take into account not only variations of demand as a function of time-of-day, but also as a function of the price of the service. The scheduling model would then incorporate a behavioral function, using various fare elasticities of demand.

It is also recommended that the model be used to study alternative Relay networks to further analyze the underutilization problem noted in the transcontinental case. One such expanded Aerial Relay System is shown in Figure 12, a network which would cover all the large hubs in the U.S. The Relay system can also be expanded to provide a transatlantic service.

Alternative scenarios for the Aerial Relay System should also be investigated. The transcontinental case study analyzed focused on origin-destination traffic. The case of connecting traffic instead of O-D traffic utilizing the Relay system in an expanded version would be the first priority.

Finally, it is recommended that additional studies be undertaken on possible implementation problems that could be faced by the Aerial Relay System. Aside from engineering considerations, these include the economic feasibility of the system and the institutional structure under which the Relay system would be most feasible.

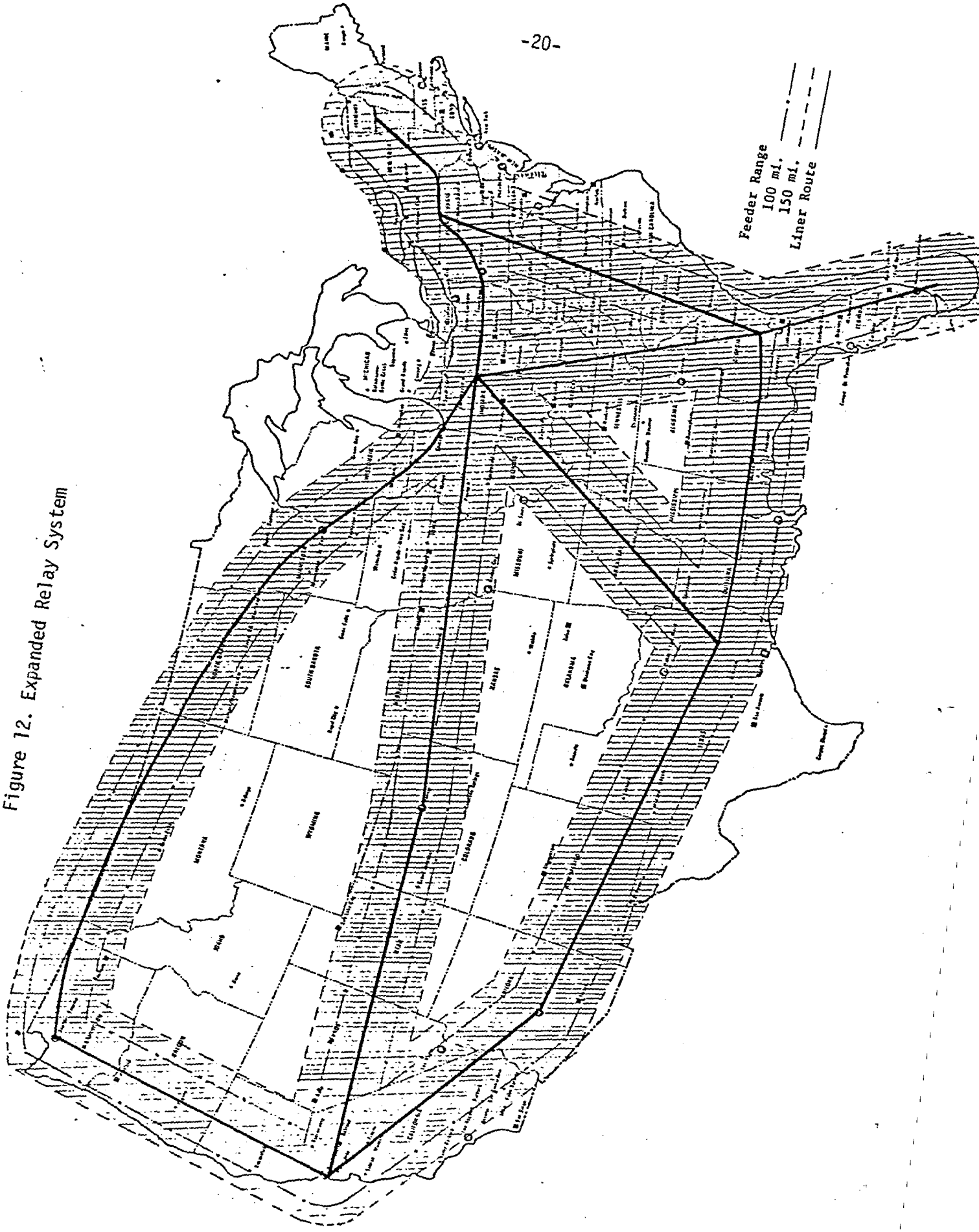


Figure 12. Expanded Relay System

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APPENDIX A

TIME-OF-DAY DEMAND DISTRIBUTION MODEL

Eriksen's 1978 work on the determination of time-of-day demand functions is used in the Relay scheduling model. Based on data provided by Eastern Airlines from the New York/Boston shuttle, a demand-responsive service, Eriksen derived a theoretical time-of-day demand distribution.

The initial step of this derivation is to split the day into forty-one time points (j = 1, 2, ..., 41) at half hour intervals starting at 4:00 a.m. and ending at 12:00 midnight [t(1) = 4.0, t(2) = 4.5, ..., t(41) = 24.0]. At each time point, j, a fraction p(j) of the total number of daily passengers desire to depart from Boston to New York or vice versa, as indicated by the empirical data provided by Eastern and shown in Figure A.1.

A basic assumption is that the proportion p(j) of the total number of daily passengers desire to depart at time t(j) for one of two reasons:

(1) The time of day t(j) is a preferred time to depart;

or (2) The time of day t(j + 2) is an attractive time to arrive.

The arrival time t(j + 2) is employed because the time points, j, are separated by half-hour intervals, and one hour is the approximate flight time between Boston and New York.

In order to project this distribution over all markets, the following two assumptions were made:

(1) The distribution of preferred departure times from any region is $P_D(j) = p(j)$ for j = 1, 2, ..., 41

and (2) The distribution of attractive arrival times at any region is $P_A(1) = P_A(2) = 0.0$, $P_A = p(j - 2)$ for j = 3, 3, ..., 43,

where t(42) = 12:30 a.m. and t(43) = 1:00 a.m.

A final assumption in this derivation is that the proportion of daily passengers wishing to depart a given origin for a given destination at time t(j) is a <u>multiplicative</u> function of the preferability of departure at t(j), $P_D(j)$, and the attractiveness, $P_A(j_{arr})$, of arriving at the destination at the arrival time, $t(j_{arr})$. A multiplicative form was chosen over an additive form after consideration of a typical west to east transcontinental market. Seven o'clock in the evening, t(j) = 19.0, is a reasonable time of day for departure. However, a departure from a west coast region for an east coast region at 7:00 p.m. on a

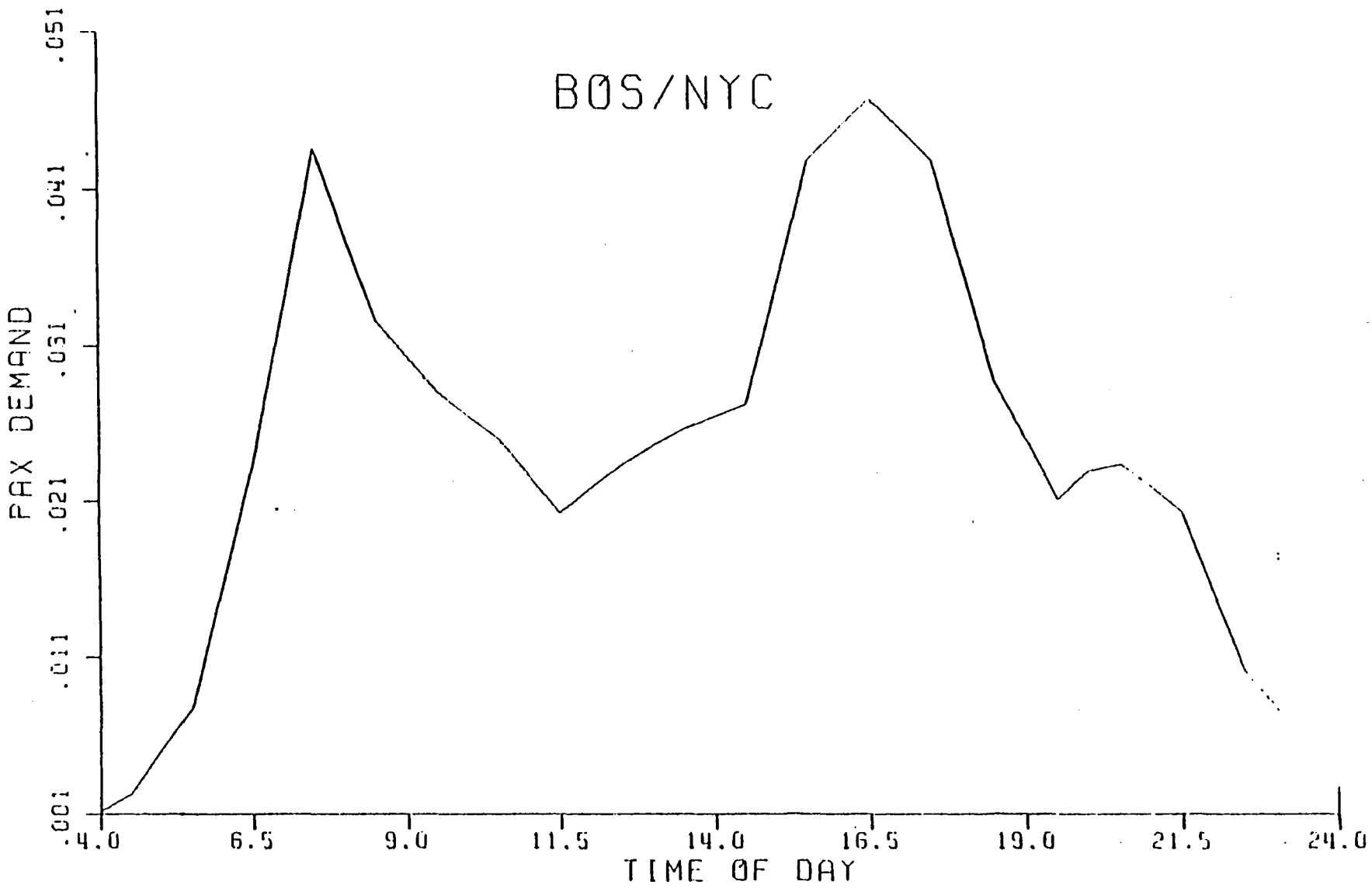


Figure A1 **Empirical Time of Day Demand Distribution for Eastern Airlines' Boston/New York Air Shuttle**

nonstop jet would result in an arrival on the east coast at 3:00 a.m. (five hours flying time plus three time zones). If an additive form were employed, the preferability of departing at 7:00 p.m. would make this flight look desirable, whereas in using the multiplicative form the null attraction of a 3:00 a.m. arrival, $P_A(j_{arr}) = 0.0$, will completely eliminate the desirability of this time of departure.

The functional form of $\pi(j)$ for any given market is thus taken to be as follows:

$$\pi_j = \frac{\sqrt{p(j) \cdot p(j + \partial)}}{\sum_{j=1}^{41} \sqrt{p(j) \cdot p(j + \partial)}}$$

where

∂ = $2(t_o + Z) - 2$ (rounded to nearest integer)

t_o = nonstop jet time (hours)

Z = number of time zones crossed (positive if west to east, negative if east to west)

The first term in the definition of ∂, $2(t_o + Z)$, is the local clock time difference, in half hours, between the departure and arrival times of a nonstop jet. The second term, -2, accounts for the shift in time axis between $P_D(j)$ and $P_A(j)$ as mentioned above. The motivation for the radical is that the use of the straight multiplicative form, $p(j) \cdot p(j + \partial)$, would not result in the original distribution, $p(j)$, for one hour markets such as New York to Boston, where the radical form does. The summation term in the denominator normalizes so that the sum of the $\pi(j)$ terms over the entire day will equal unity.

Some examples are given below:

<u>Boston to New York</u>: $t_o = 1.0$ $\qquad Z = 0$

$\partial = 2(t + z) - 2(1.0 + 0) - 2 = 0$

$\pi_j = p(j) \qquad j = 1, 2, \ldots, 41$

This results in the original p(j) distribution, as shown in Figure A.1.

Chicago to Los Angeles: $t_o = 4.0$

$\partial = 2(t_o + Z) - 2(4.0 - 2) - 2 = 2$

The π_j distribution for Chicago to Los Angeles is shown in Figure A.2.

Los Angeles to Chicago: $t_o = 3.5$ $Z = 2$

$\partial = 2(t_o + Z) - 2 = 2(3.5 + 2) - 2 = 9$

The π_j distribution for Los Angeles to Chicago is shown in Figure A.3.

Boston to San Francisco: $t_o = 6.0$ $Z = -3$

$\partial = 2(t_o + Z) - 2 = 2(6.0 - 3) - 2 = 4$

The π_j distribution for Boston to San Francisco is shown in Figure A.4.

San Francisco to Boston: $t_o = 5.0$ $Z = 3$

$\partial = 2(t_o + Z) - 2 = 2(5.0 + 3) - 2 = 14$

This π_j distribution is shown in Figure A.5. The computer program used in the Relay Scheduling Model to compute time-of-day demand distribution is given in Table A.1.

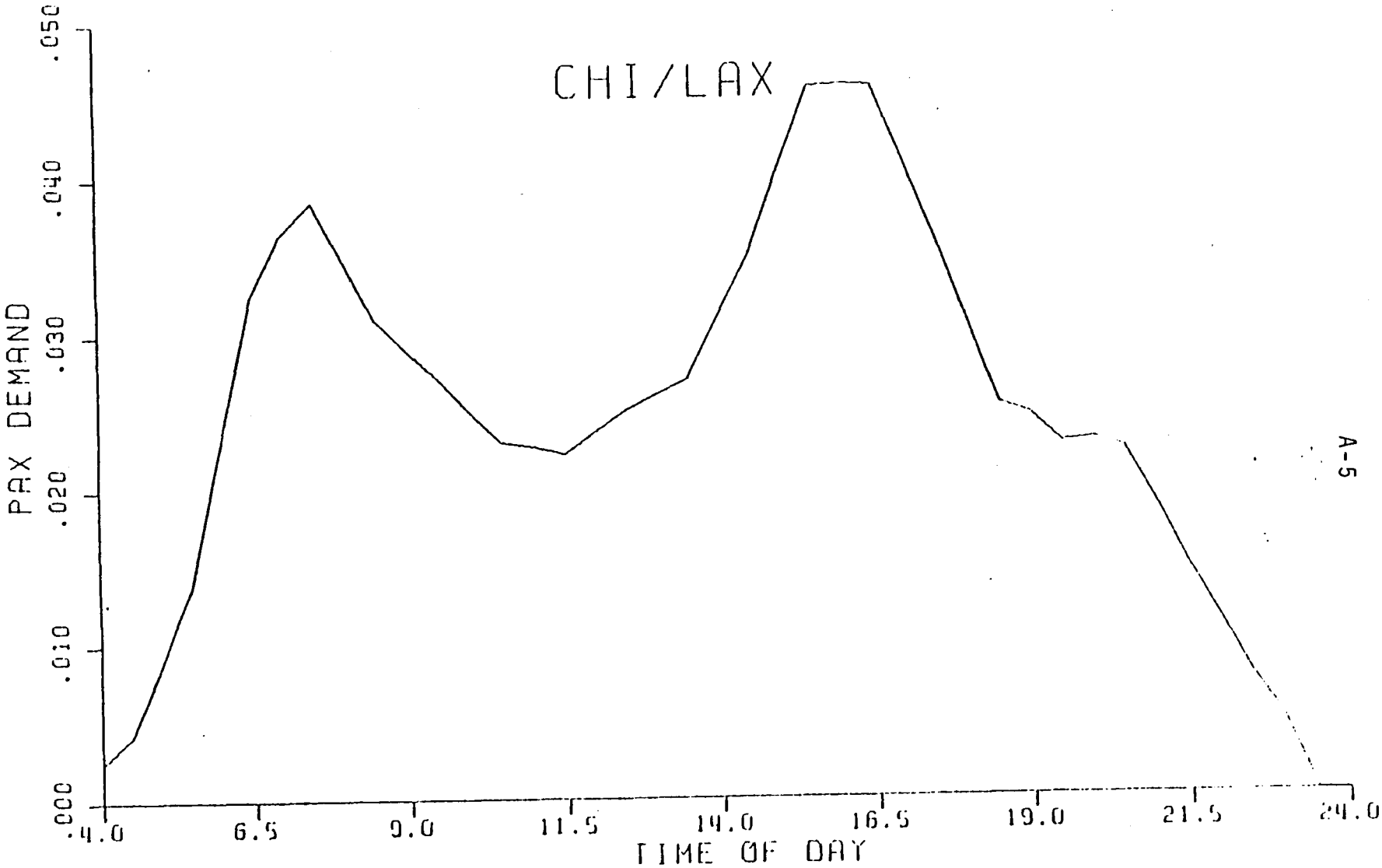


Figure A2 Theoretical Time of Day Demand Distribution for Chicago to Los Angeles

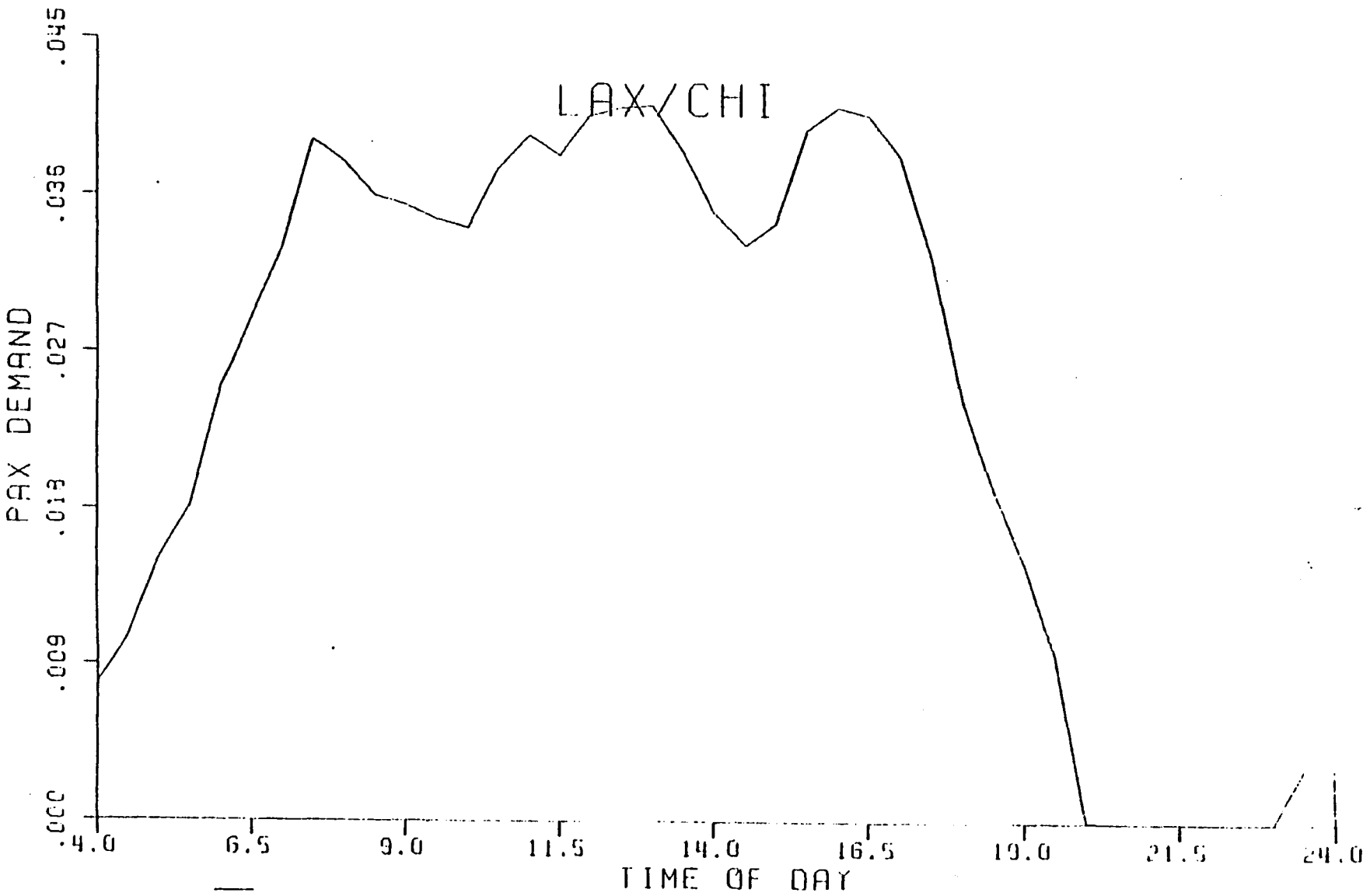


Figure A3. Theoretical Time of Day Demand Distribution for Los Angeles to Chicago

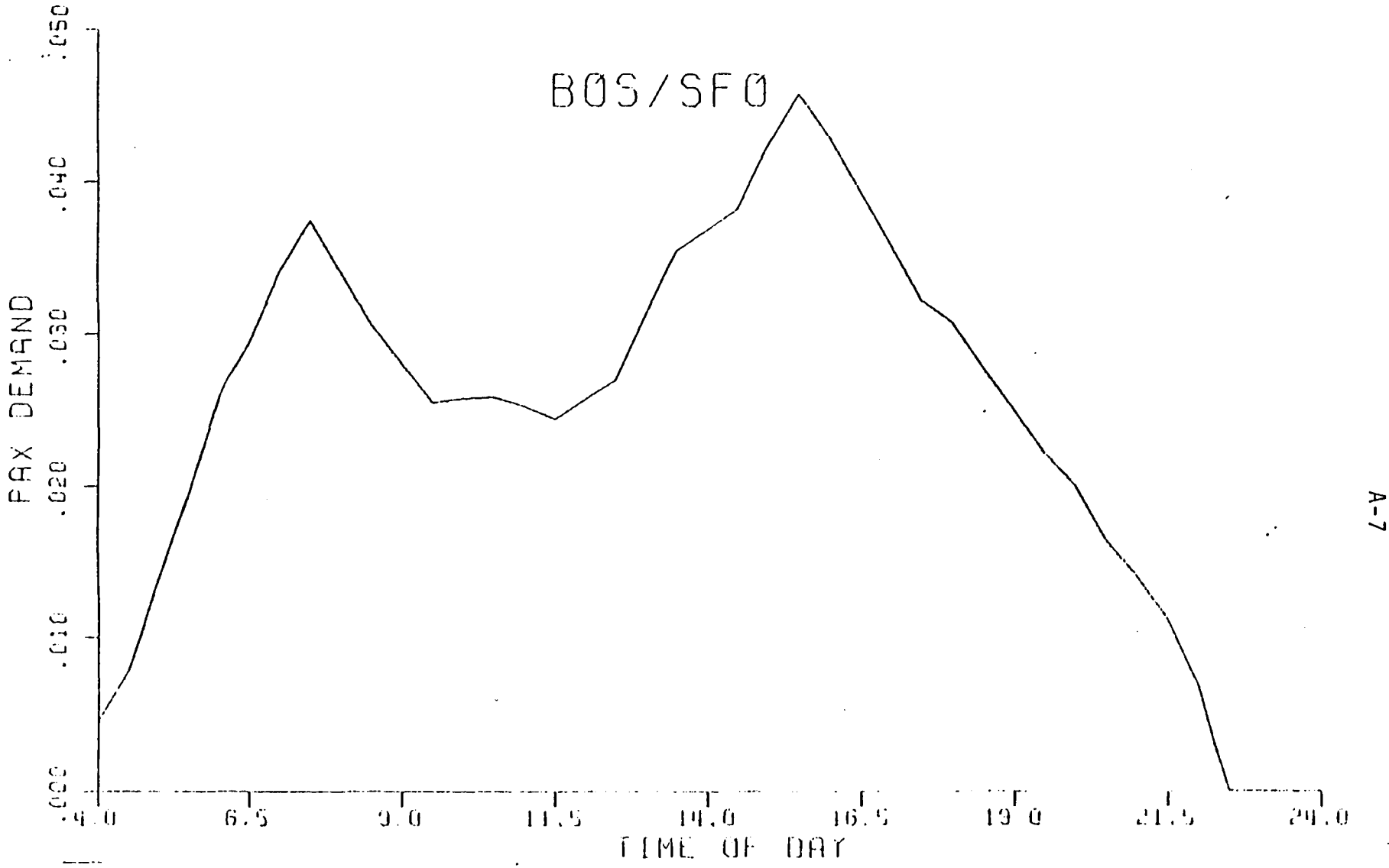


Figure A4 Theoretical Time of Day Demand Distribution for Boston to San Francisco

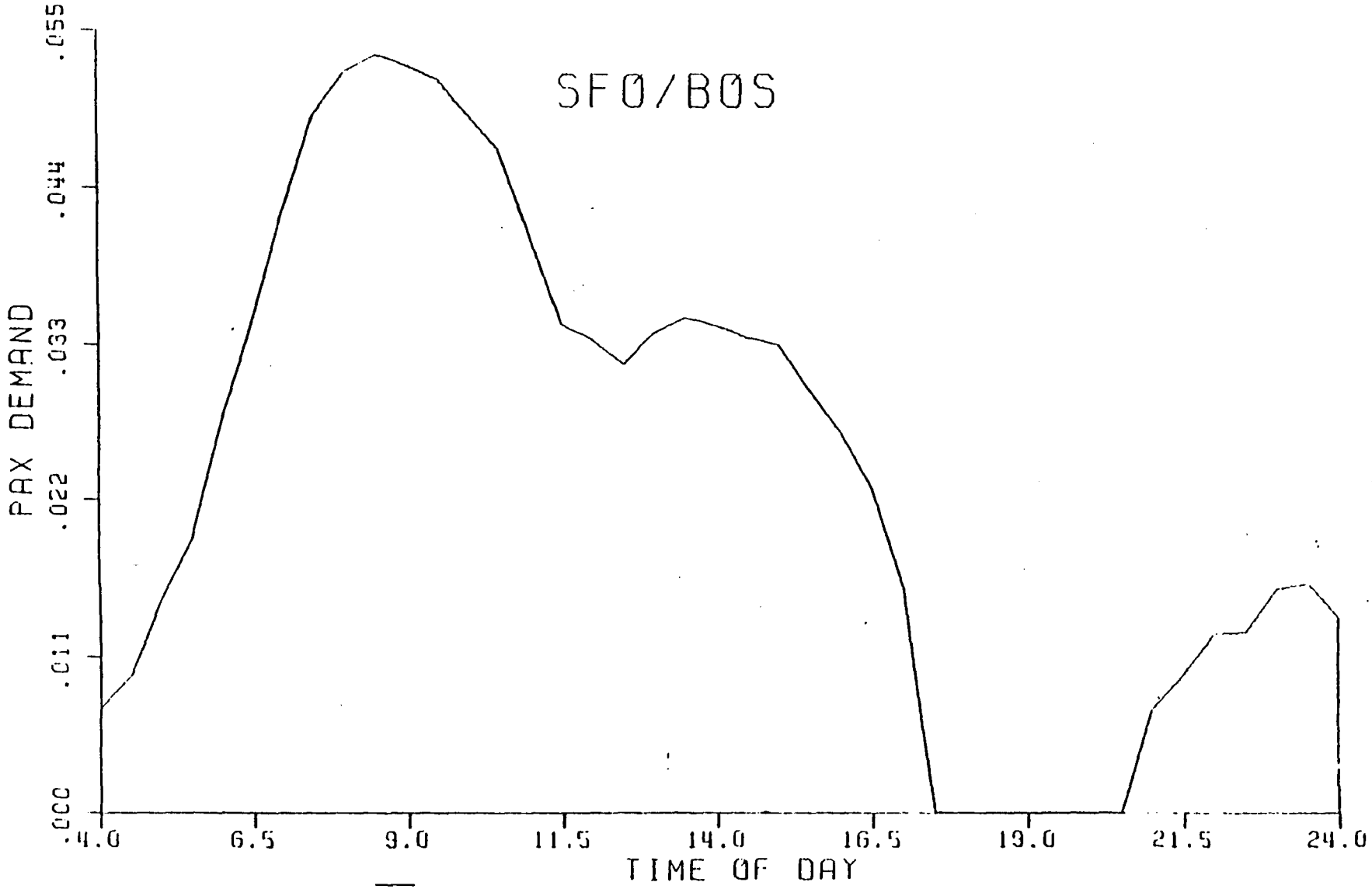


Figure A5 Theoretical Time of Day Demand Distribution for San Francisco to Boston

Table A1 Time of Day Distribution Program

```
C                                                                       TOFD0001
C     E. W. LIU     M.I.T. FLIGHT TRANSPORTATION LABORATORY             TOFD0002
C                                                                       TOFD0003
C     TIME OF DAY AT THE HUBS ALONG MAIN ROUTE OF AERIAL RELAY SYSTEM   TOFD0004
C                                                                       TOFD0005
      DIMENSION T(41),PI(41),PAX(41),P(60),WE(41),EW(41)                TOFD0006
      REAL*8 CITPR                                                      TOFD0007
C*****ASSIGN CLOCK TIMES T(J) TO TIME POINTS(J)                         TOFD0008
      A=1.                                                              TOFD0009
      DO 10 J=1,41                                                      TOFD0010
      T(J)=3.5+A/2.                                                     TOFD0011
10    A=A+1.                                                            TOFD0012
C*****INPUT ORIGIONAL TIME OF DAY DISTRIBUTION                          TOFD0013
      READ(5,20) (P(J),J=1,41)                                          TOFD0014
20    FORMAT(F5.4)                                                      TOFD0015
      DO 30 J=42,60                                                     TOFD0016
      JM48=J-48                                                         TOFD0017
      IF(J.LT.49) GO TO 35                                              TOFD0018
      P(J)=P(JM48)                                                      TOFD0019
      GO TO 30                                                          TOFD0020
35    P(J)=0.0                                                          TOFD0021
30    CONTINUE                                                          TOFD0022
C*****INPUT DATA CARD: BKT=BLOCK TIME, ZONE=ZONE TIME, CITPR=CITY PAIR  TOFD0023
C*****PASSENGER DISTRIBUTION AT TIME OF DAY MODEL ON EACH HUB*****      TOFD0024
C*****PPD=NUMBER OF ON LINE ORIGION-DESTINATION PASSENGERS PER DAY BETWEEN HUBS  TOFD0025
111   READ(5,40) BKT,ZONE,CITPR,PPD,L40                                 TOFD0026
40    FORMAT(12X,F4.2,F3.0,1X,A7,2X,F5.0,5X,I1)                         TOFD0027
      IF(BKT.LT.0.) GO TO 500                                           TOFD0028
C*****DELTA IS THE EXTENT (HALF HOURS) BY WHICH THE TIME AXIS IS SHIFTED TOFD0029
      DELTA=2.0*(BKT+ZONE)-2.0                                          TOFD0030
      SUMPI=0.0                                                         TOFD0031
C*****SHIFT AXES AND MULTIPLY P(J)'S                                    TOFD0032
      DO 50 J=1,41                                                      TOFD0033
      JA=J+DELTA                                                        TOFD0034
      IF(JA.LT.1) GO TO 55                                              TOFD0035
      PI(J)=SQRT(P(J)*P(JA))                                            TOFD0036
```

Table A1 Time of Day Distribution Program

```
      GO TO 56                                                                  TOFD0037
55    PI(J)=0.0                                                                 TOFD0038
56    SUMPI=SUMPI+PI(J)                                                         TOFD0039
50    CONTINUE                                                                  TOFD0040
C*****NORMALIZE TO SUM OF ONE                                                   TOFD0041
      DO 60 J=1,41                                                              TOFD0042
      PI(J)=PI(J)/SUMPI                                                         TOFD0043
      PAX(J)=PI(J)*PPD                                                          TOFD0044
      IF(L40.EQ.1) GO TO 222                                                    TOFD0045
      EW(J)=EW(J)+PAX(J)                                                        TOFD0046
      GO TO 60                                                                  TOFD0047
222   WE(J)=WE(J)+PAX(J)                                                        TOFD0048
60    CONTINUE                                                                  TOFD0049
C*****PRINT TITLE                                                               TOFD0050
      WRITE(6,70) CITPR                                                         TOFD0051
70    FORMAT(' ',59X,A7,//,26X,'TIME  PI   PAX/D',4X,'TIME  PI   PAX/D',        TOFD0052
     15X,'TIME  PI   PAX/D',5X,'TIME  PI   PAX/D',/)                            TOFD0053
C*****PRINT DISTRIBUTION OF TIME OF DAY FOR EACH CITY PAIR                      TOFD0054
      DO 80 I1=1,10                                                             TOFD0055
         I2=I1+10                                                               TOFD0056
         I3=I2+10                                                               TOFD0057
         I4=I3+10                                                               TOFD0058
      WRITE(6,90) T(I1),PI(I1),PAX(I1),T(I2),PI(I2),PAX(I2),                    TOFD0059
     8T(I3),PI(I3),PAX(I3),T(I4),PI(I4),PAX(I4)                                 TOFD0060
90    FORMAT(25X,F4.1,F7.3,F5.0,5X,F4.1,F7.3,F5.0,5X,F4.1,F7.3,F5.0,5X,          TOFD0061
     9F4.1,F7.3,F5.0)                                                           TOFD0062
80    CONTINUE                                                                  TOFD0063
      WRITE(6,100) T(41),PI(41),PAX(41)                                         TOFD0064
100   FORMAT(88X,F4.1,F7.3,F5.0,//////)                                         TOFD0065
      GO TO 111                                                                 TOFD0066
500   WRITE(6,699)                                                              TOFD0067
699   FORMAT('1',45X,'TIME',8X,'SUM OF PAX W-E',8X,'SUM OF PAX E-W',//)         TOFD0068
      WRITE(6,700) (T(J),WE(J),EW(J),J=1,41)                                    TOFD0069
700   FORMAT(' ',45X,F4.1,11X,F9.0,12X,F9.0)                                    TOFD0070
      STOP                                                                      TOFD0071
      END                                                                       TOFD0072
```

APPENDIX B
DEMAND ALLOCATION MODEL

The passenger's behavior is assumed to be rational; i.e., preference is given to shorter versus longer total trip times. First, to be compatible with the time-of-day demand distribution, the day is divided into 48 intervals of one-half hour each. Each half-hour slice has a fraction of the daily demand for air transportation. These passengers consider all possible services offered during the day. Each service has associated with it a total trip time (including the displacement time from the slice under consideration). A behavioral "desirability" parameter can be computed for each service offering for the passengers of each time slice. For the Aerial Relay model, a simple time-desirability function shown in Figure B1 was used, which takes on the discrete values of 1, 0.5, 0.25, 0 for time differences of 0, 1, 2, 3 half-hour units respectively.

To illustrate the entire demand allocation process, two sample cases are presented in Figures B2 and B3. In Figure B2 the displacement time, Δt, between Flights 1 and 2 is assumed to be between 90-120 minutes ($3\delta_t < \Delta t \leq 4\delta_t$). According to the time-desirability function, the relative preferences for Flight 1 for the half-hour intervals δ_{t_1}, δ_{t_2}, δ_{t_3}, and δ_{t_4} are 1, 0.5, 0.25, 0, respectively. The relative preferences for Flight 2 for δ_{t_1}, δ_{t_2}, δ_{t_3}, and δ_{t_4} are 0, 0.25, 0.5 and 1.0. Thus, Flight 1 gets all of the demand (12.6%) of the first time slice, δ_{t_1}. For the second time slice, δ_{t_2}, the 25.3% of the demand is allocated proportionally to the preference weights, for a split of 0.168 for the first flight and 0.084 for the second flight. For δ_{t_3} these weights are reversed, and for δ_{t_4} all the demand goes to Flight 2, as shown in Figure B2.

Figure B3 shows the case where Flight 2 falls beyond the fourth time slice, i.e., beyond t_5, and Flight 1 falls within the first time slice. δ_{t_1}. All of the demand in time slices δ_{t_1} and δ_{t_2} will be assigned to the first flight (although the desirability value of Flight 1 for δ_{t_2} is 0.5, it is zero for Flight 2). The demand in δ_{t_3} is allocated equally to

Figure B1. Relay System Time-Desirability Function

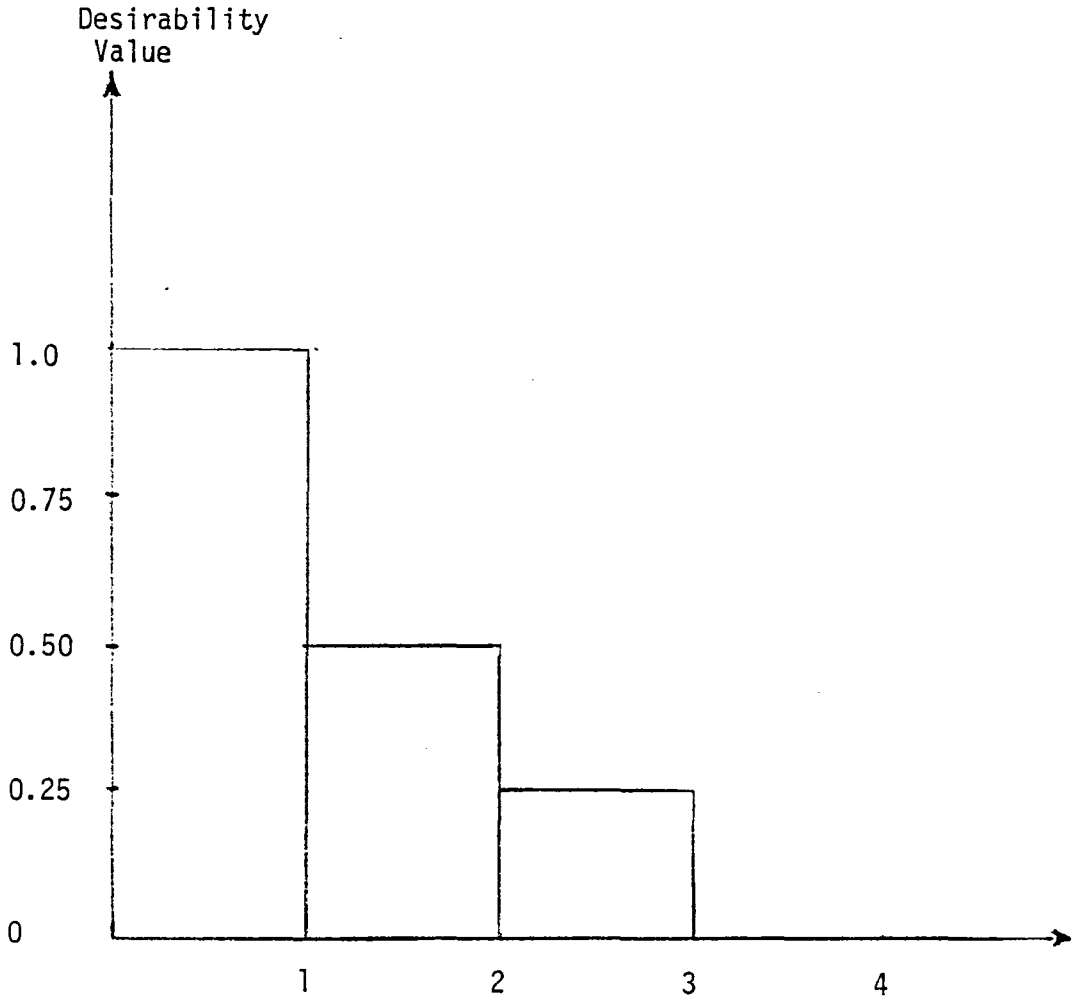
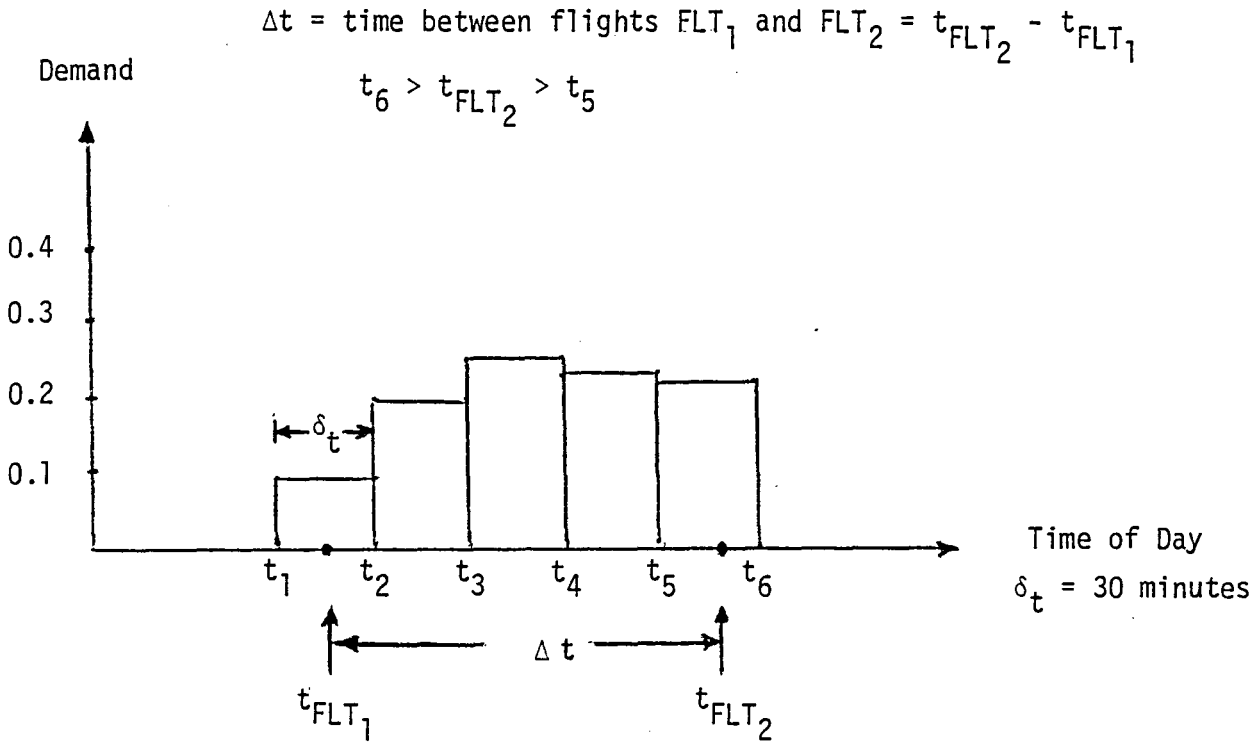
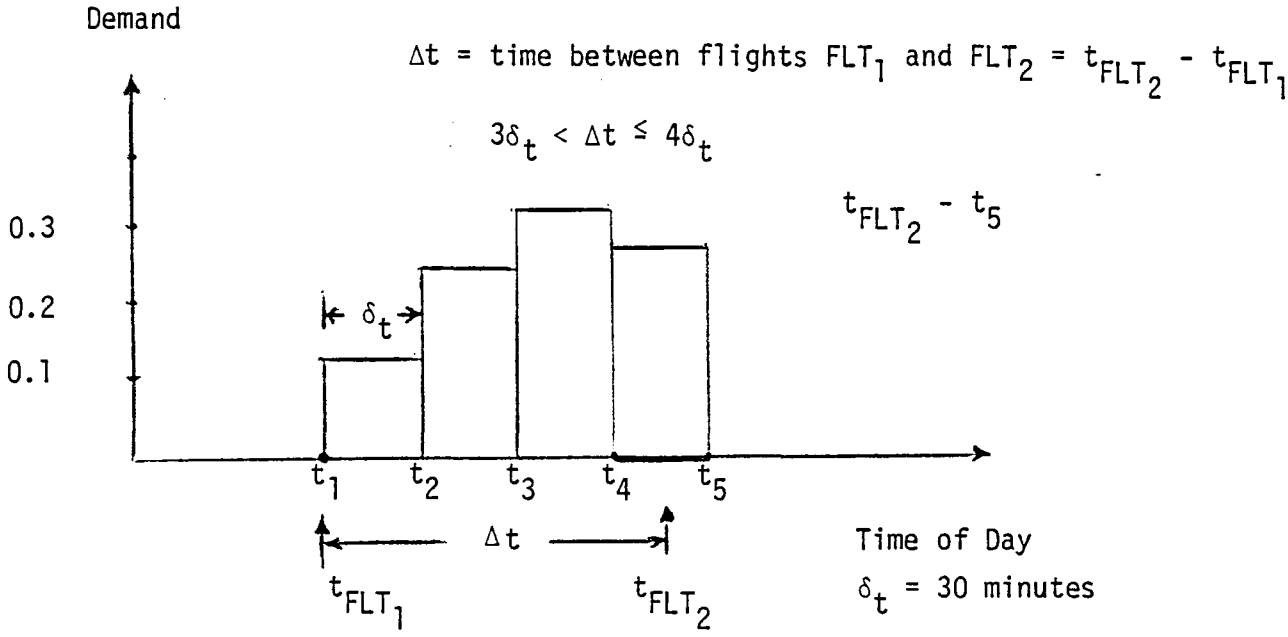


Figure B3. Illustration of Demand Allocation (2)



Time-of-Day Slice	Total Demand	Demand Fraction	Desirability Value Of Flight 1	Desirability Value Of Flight 2	Demand Allocated to Flight 1	Demand Allocated to Flight 2
1	50	0.099	0.099	0	50	0
2	100	0.199	0.199	0	100	0
3	130	0.257	0.128	0.128	65	65
4	115	0.227	0	0.227	0	115
5	110	0.217	0	0.217	0	110
Total	505	1.0	0.426	0.576	215	290

Figure B2. Illustration of Demand Allocation (1)



Time-of-Day Slice	Total Demand	Demand Fraction	Desirability Value Of Flight 1	Desirability Value Of Flight 2	Demand Allocated to Flight 1	Demand Allocated to Flight 2
1	50	0.126	0.126	0.0	50	0
2	100	0.253	0.168	0.084	66	33
3	130	0.329	0.109	0.218	43	66
4	115	0.291	0.0	0.291	0	115
Total	395	1.0	0.405	0.595	160	235

Flights 1 and 2 (having a desirability value of 0.25 for both flights). The demand in δ_{t_4} and δ_{t_5} is allocated totally to Flight 2 by the same logic that assigned δ_{t_1} and δ_{t_2} to Flight 1.

Given the Relay system time-desirability function of Figure B1, it is assumed that two flights will not be separated by more than 6 time units (180 minutes), or else the passengers in the middle time slices will be denied boarding.

APPENDIX C

TRANSCONTINENTAL CITY-PAIR TRAFFIC DEMANDS

Appendix C contains the 12 city pair O-D traffic demand distributions used for the transcontinental case study.

Table C1: City Pair O & D Passenger Flow

Los Angeles & San Francisco

City	Outbound from L.A. Number of Passengers/Day	Outbound from San Francisco Number of Passengers/Day
Denver	674	414
Chicago	1,272	745
Milwaukee	99	57
Detroit	389	211
Cleveland	224	101
Pittsburg	194	111
Washington, DC	530	362
Baltimore	99	112
Philadelphia	342	209
New York	1,720	1,149
Boston	416	313
TOTAL:	5,959	3,784

Table C2: City Pair O & D Passenger Flow

Denver

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	674	667
San Francisco	414	406
TOTAL:	1,088	1.073

City	Outbound Number of Passengers/Day
Chicago	844
Milwaukee	100
Detroit	127
Cleveland	80
Pittsburgh	88
Washington, DC	233
Baltimore	66
Philadelphia	115
New York	476
Boston	148
TOTAL:	2,277

Table C3: City Pair O & D Passenger Flow

Chicago

	Inbound	Outbound
City	Number of Passengers/Day	Number of Passengers/Day
Los Angeles	1,272	1,210
San Francisco	745	754
Denver	844	837
TOTAL:	2,861	2,801

	Outbound
City	Number of Passengers/Day
Detroit	971
Cleveland	664
Pittsburgh	551
Washington, DC	935
Baltimore	252
Philadelphia	656
New York	2,570
Boston	689
TOTAL:	7,288

Table C4: City Pair O & D Passenger Flow

Milwaukee

	Inbound	Outbound
City	Number of Passengers/Day	Number of Passengers/Day
Los Ageles	99	97
San Francisco	57	58
Denver	100	99
TOTAL:	256	254

	Outbound
City	Number of Passengers/Day
Detroit	176
Cleveland	61
Piitsburgh	33
Washington, DC	91
Baltimore	7
Philadelphia	54
New York	214
Boston	58
TOTAL:	694

Table C5: City Pair O & D Passenger Flow

Detroit

	Inbound	Outbound
City	Number of Passengers/Day	Number of Passengers/Day
Los Angeles	389	361
San Francisco	211	206
Denver	127	125
Chicago	971	889
Milwaukee	176	174
TOTAL:	1,874	1,755

	Outbound
City	Number of Passengers/Day
Cleveland	299
Pittsburgh	234
Washington, DC	408
Baltimore	78
Philadelphia	293
New York	1,014
Boston	255
TOTAL:	2,581

Table C6: City Pair O & D Passenger Flow

Cleveland

	Inbound	Outbound
City	Number of Passengers/Day	Number of Passengers/Day
Los Angeles	224	219
San Francisco	101	103
Denver	80	84
Chicago	664	631
Milwaukee	61	70
Detroit	299	305
TOTAL:	1,429	1,412

	Outbound
City	Number of Passengers/Day
Pittsburgh	124
Washington, DC	269
Baltimore	76
Philadelphia	219
New York	743
Boston	183
TOTAL:	1,614

Table C7: City Pair O & D Passenger Flow

Pittsburgh

	Inbound	Outbound
City	Number of Passengers/Day	Number of Passengers/Day
Los Angeles	194	191
San Francisco	111	111
Denver	88	89
Chicago	551	547
Milwaukee	33	27
Detroit	234	238
Cleveland	124	143
TOTAL:	1,335	1,346

	Outbound
City	Number of Passengers/Day
Washington, DC	291
Baltimore	114
Philadelphia	469
New York	910
Boston	227
TOTAL:	2,011

Table C8: City Pair O & D Passenger Flow

Washington, DC

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	530	517
San Francisco	362	361
Denver	233	235
Chicago	935	938
Milwaukee	91	91
Detroit	408	423
Cleveland	269	278
Pittsburgh	291	305
TOTAL:	3,119	3,148

City	Outbound Number of Passengers/Day
Baltimore	50
Philadelphia	191
New York	2,463
Boston	966
TOTAL:	3,670

Table C9: City Pair O & D Passenger Flow

Baltimore

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	99	97
San Francisco	112	110
Denver	66	64
Chicago	252	251
Milwaukee	7	7
Detroit	78	94
Cleveland	76	70
Pittsburgh	114	1,112
Washington, DC	50	56
TOTAL:	854	1,861

City	Outbound Number of Passengers/Day
Philadelphia	37
New York	271
Boston	228
TOTAL:	536

Table C10: City Pair O & D Passenger Flow

Philadelphia

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	342	325
San Francisco	209	219
Denver	115	119
Chicago	656	628
Milwaukee	54	56
Detroit	293	311
Cleveland	219	213
Pittsburgh	469	465
Washington, DC	191	180
Baltimore	37	37
TOTAL:	2,585	2,553

City	Outbound Number of Passengers/Day
New York	191
Boston	581
TOTAL:	772

Table C11: City Pair O & D Passenger Flow

New York

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	1,720	1,700
San Francisco	1,149	1,189
Denver	476	486
Chicago	2,570	2,582
Milwaukee	214	219
Detroit	1,014	1,054
Cleveland	743	761
Pittsburgh	910	915
Washington, DC	2,463	2,438
Baltimore	271	264
Philadelphia	191	174
TOTAL:	11,721	11,782

Table C12: City Pair O & D Passenger Flow

Boston

City	Inbound Number of Passengers/Day	Outbound Number of Passengers/Day
Los Angeles	416	403
San Francisco	313	303
Denver	148	153
Chicago	689	680
Milwaukee	58	59
Detroit	255	258
Cleveland	183	185
Pittsburgh	227	240
Washington, DC	966	941
Baltimore	228	238
Philadelphia	581	582
TOTAL:	4,064	4,042

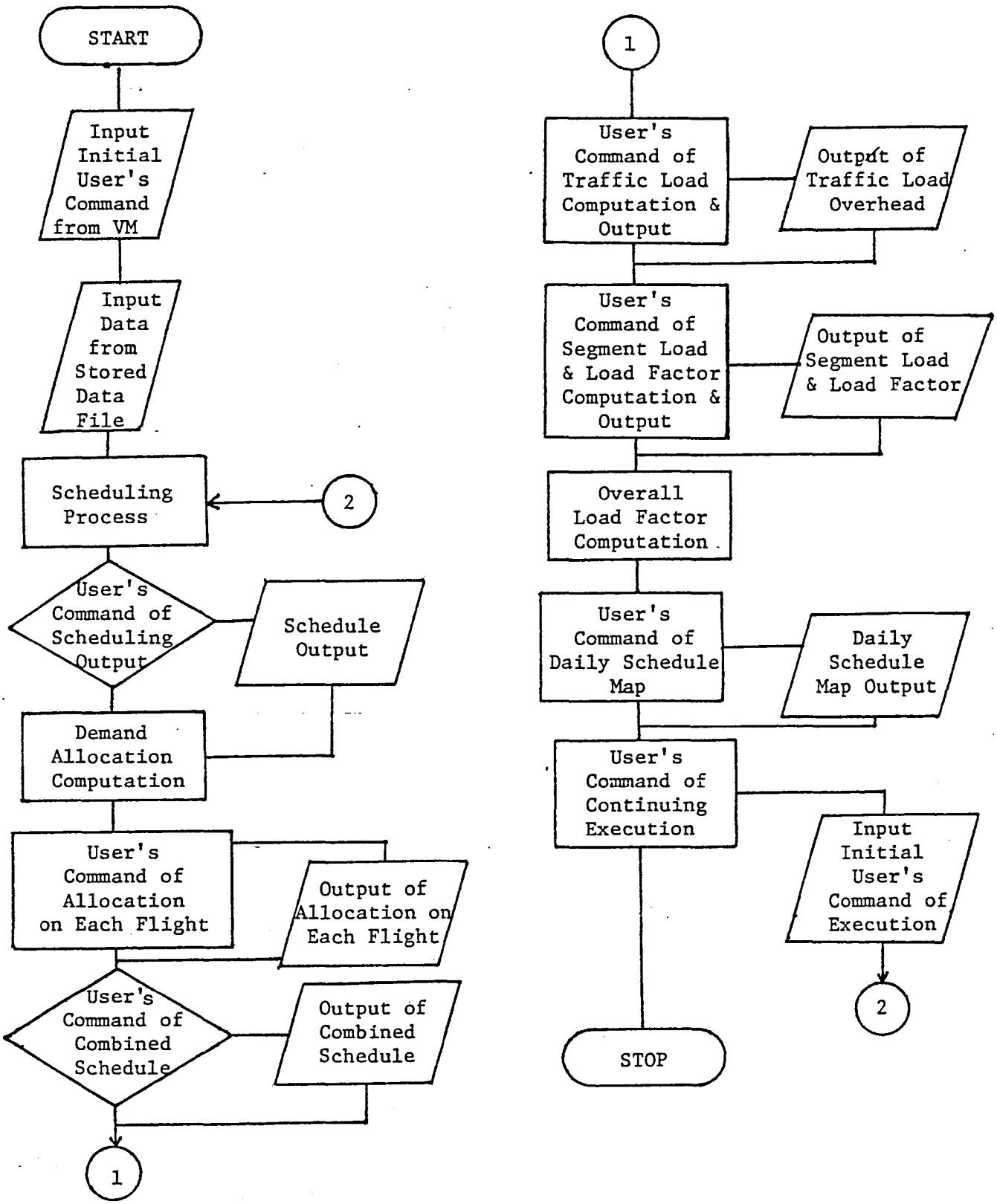
APPENDIX D

THE SCHEDULING MODEL: DESCRIPTION AND COMPUTER CODE

The Relay Scheduling Model was programmed using FORTRAN language on the IBM Virtual Machine Facility/370 at the Information Processing Center at MIT. VM/370 is a system control program that controls the functional equivalent of a real computer. The user controls his virtual machine from a terminal, using the Conversational Monitor System (CMS). Each command, or request for work, that the user enters on his terminal is processed when it is entered.

The Scheduling Model produces schedules, traffic loads, load factors on segments, and various statistical distributions. It requires as input the number of liners, their seat capacity, a critical segment load factor, and first departure times for liners from Boston. These entries are required to initialize the program for the transcontinental case study. The program operates in several steps as shown in Figure D1. First, the input must be prepared and submitted. The program then constructs an initial schedule upon which the demand allocation sub-model will operate. (The program actually determines the departure schedules for each city as the liner passes overhead; then it groups and combines these schedules by each city to produce a schedule of departures in sequential order.) The passenger demands are then allocated to meet the scheduled flights at each city, i.e., the time-of-day demand occurring during every half-hour interval is assigned to specific flights. (The program checks to insure that the liner departures from Boston are not separated by more than three hours, so that all demand is served according to the time-desirability function.)

Figure D1. . Flow Chart of the Scheduling Model



Format and Definition of Input Parameters

Two types of input are required to execute the program: (1) User's Command, (2) Program Parameters. The User's Command determines a variety of logical decisions during the execution process. The User's Command is entered by typing yes/no for each required logic decision. Each numerical command is required to follow a specific format. (The alphabetic command can be entered by using either lower or upper case characters; the entries will be transformed into upper case in the system.)

The Program Parameters include (1) airport code and time zone from GMT, (2) block time between cities, (3) westbound and eastbound mileage of each segment, (4) time-of-day demand of city pairs summarized for each city. The computer code given in Table D1 is described in detail below:

(1) Airport code and time zone from GMT

```
READ(8,400) (CITY(I),IZONE(I),I=1,11)
400 FORMAT(11(A3,1X,I1,2X))
```

CITY = The airport code as designated in Official Airline Guide. There are 11 cities enroute from west to east; i.e. BOS (Boston) as CITY (1), CHI (Chicago) as CITY (8).

IZONE = The integer number of time zone at each city. This is the number of hours from Greenwich Mean Time of each city; i.e., IZONE(1) = 5 for BOS, IZONE(9) = 7 for DENver

(2) Block time between cities

```
READ(8,401) ((IBKT(I,J),J=1,11),I-1,4)
401 FORMAT(11(13,2X))
```

IBKT = Block times between each city pair along the route. In the double round trip pattern used, a two-minute turn-

around time is added at Boston; one minute is added on arrival of first flight, and another minute is added on departure of second flight of each liner

(3) Westbound and eastbound mileage of each segment

```
READ(8,402) (MLW(M),M=1,10)
402 FORMAT(10(I3,2X))
READ(8,403) (MLE(N),N=1,9)
403 FORMAT(9(I3,2X))
```

MLW = Mileage of westbound flight from Boston to Los Angeles passing through San Francisco

MLE = Mileage of eastbound flight from Los Angeles to Boston. There are nine segments in eastbound flight; the departure from Los Angeles to Denver does not fly over San Francisco

(4) Time-of-day demand of city pairs summarized for each city

```
 74 READ(8,201) (IFTSH(I),IFTSM(I),LPAXO(I),LPAXI(I),I=1,41)
201 FORMAT(6X,I2,I2,6X,I4,6X,I4)
```

IFTSH = Time-of-day demand at the specific hour; from 4 a.m. to 12 p.m.

IFTSM = Time-of-day demand at the specific time (minute); between any two hours

LPAXO = The summed outbound passengers from each hub to the enroute cities beyond, at specific time through the day

LPAXI = The summed inbound passengers for each hub from the enroute cities, at specific time through the day

The device for the linkage between the program parameter data file and the main program is designated number 8, which is shown in the READ statement

of these parameters. In order to differentiate between the input process of user's command and program parameters, device number 5 is assigned as the user's command for sequential input from the terminal. The Control Program (CP) controls the resources of the real machine; it also manages the communications between the virtual machine and the real system such as the designation of the device number for input mode control.

Execution Sequence and Output Process

The execution takes place in seven steps:

(1) Scheduling Process:

After the data is input to the system during the initial execution stage, the program begins the scheduling process. For the transcontinental case, the liner departures are designed to perform two round trips per day, i.e., each flight departs from Boston to Los Angeles and then returns to Boston after 12 hours. Following a 2-minute turnaround time, the same liner proceeds over the same course for a second round-trip flight. From the input data of block time, time zone, and mileage, the schedule of a liner for each city is produced in Greenwich Mean Time as well as local time. As shown in Appendix E, the schedule of each liner is listed directionally for both westbound and eastbound flights according to enroute itineraries. The combined schedule in both directions is provided as a reference for the traffic load tabulations. In order to show a clear picture of flight schedules at each station, a scheduling map is tabulated in chronological order. The first departure schedule of each liner from Boston is also printed as a reference for the user to identify the initial entries of their desired first departure time from the daily scheduling map.

(2) Output Process of Initial Demand Data:

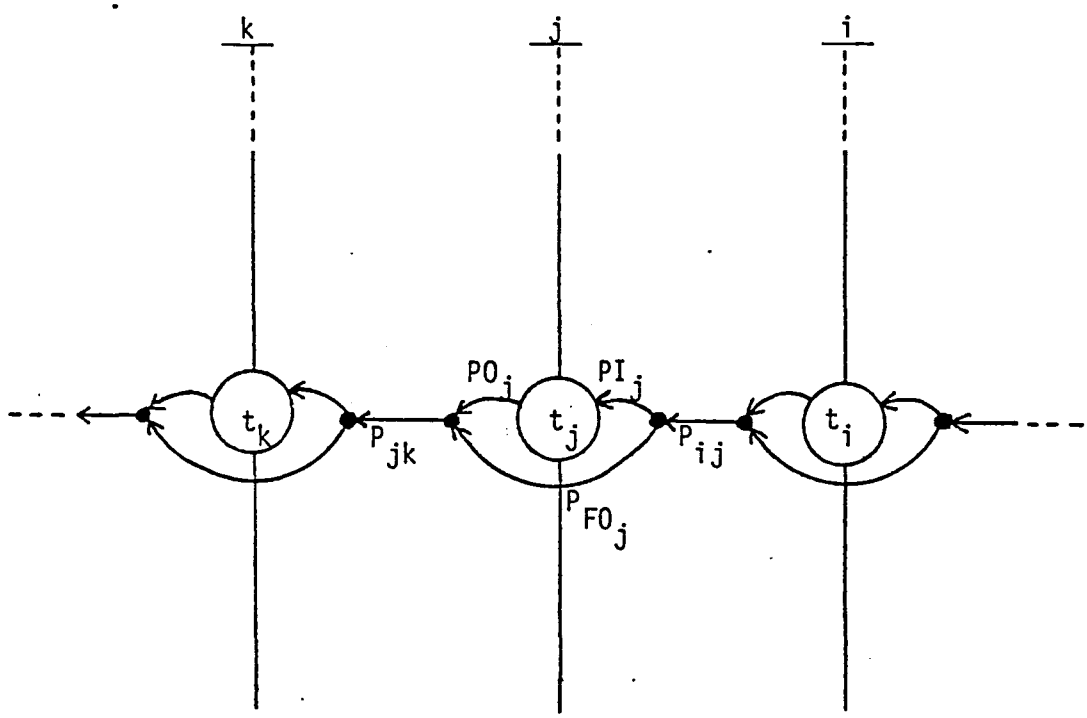
The initial demand data are transformed into standard GMT scale from 0000 to 2330 for each hub. Upon the request of user, the summed outbound and inbound passengers at each city can be generated in sequence with the corresponding Greenwich Mean Time (Appendix E).

(3) Execution and Output of Demand Allocation:

The schedules of every two adjacent flights at each city are compared in the first step of the demand allocation process. The separation time (in minutes) of every two adjacent flights determines the number of time-of-day slices of demand that have to be assigned to each flight. As described in Appendix B, the desirability function allocates the demand from each interval between the adjacent flights, and it normalizes the distribution of each interval. Repeating the same process for each flight at each city, the total traffic load of each flight is the summation of demand allocated to this flight from the time-of-day demand intervals before and after the flight schedule. For example, the 0800 flight takes passengers from the demand intervals between 0610-0800, and 0800-1035. For the time-desirability function used, the separation time between flights may not exceed 180 minutes (equivalent to six half-hour intervals); otherwise, the passengers in the middle intervals will be denied boarding. There are six subprogram loops in the main program to execute the demand allocation. Each of them handles a different separation time (i.e., loop N36 controls the allocation process for a separation time between 30 minutes and 60 minutes, etc.). The total number of passengers after the allocation for each flight can be requested by the user as output. The output shows the demand allocated on each of the two adjacent flights under the title of FLT_1 and FLT_2 for first flight and next adjacent flight respectively (see Appendix E).

(4) Computation of Enplaned Passengers over City and Segment, and Output Procedures:

The method for the computation of enplaned passengers over each city and segment is programmed in the section of traffic loads as follows:



where, k > j > i i, j, k are enroute cities

t_j = liner scheduled time at hub j

P_{ij} = on-board passenger on segment ij

PI_j = inbound passenger to j from the cities before

PO_j = outbound passenger from j to the cities beyond

P_{FO_j} = fly-over passenger passing through j, from the cities before, and to the cities beyond

Therefore, the total passengers transported at intermediate cities are,

$$\sum_{t_j}\sum_{j} P_{FO_j} = \sum_{t_j}\sum_{i<j} P_{ij} - \sum_{t_j}\sum_{j} PI_j \qquad (\forall P \text{ at } j \text{ and allocated to flight } t_j)$$

$$\sum_{t_j}\sum_{j<k} P_{jk} = \sum_{t_j}\sum_{j} P_{FO_j} + \sum_{t_j}\sum_{j} PO_j \qquad (\forall P \text{ at } j \text{ and allocated to flight } t_j)$$

There is one exception of the above formulations. It is the ending hub - Boston.

(1) For westbound flights:

$$\sum_{t}\sum_{BOS} P_{FO_{BOS}} = 0 \qquad \sum_{t}\sum_{BOS} PI_{BOS} = 0$$

$$\sum_{t}\sum_{BOS\text{-}NYC} P_{BOS\text{-}NYC} = \sum_{t}\sum_{BOS} PO_{BOS}$$

(2) For eastbound flights:

$$\sum_{t}\sum_{BOS} P_{FO_{BOS}} = 0 \qquad \sum_{t}\sum_{BOS} PO_{BOS} = 0$$

$$\sum_{t}\sum_{BOS} PI_{BOS} = \sum_{t}\sum_{NYC\text{-}BOS} P_{NYC\text{-}BOS}$$

The program processes the traffic loads for each flight over the hubs. The tabulated output of traffic loads gives the outbound, inbound, and fly-over passenger under the title of each hub with the corresponding combined GMT schedule. The tabulation is arranged as following:

NYC

858	192
outbound passenger	inbound passenger

298

fly over passenger

(5) Computation of Segment Load Factor:

Based on the user's designated number of seats for the liner, the segment load factor is computed by dividing the on-board passengers of each segment by the seat capacity. The sum of revenue-passenger-miles is divided by the sum of available-seat-miles to obtain the overall system load factor. The output format lists on-board passengers, segment load factor, and the corresponding local schedule under the title of each segment. As an example, the first westbound flight departure from New York is at GMT 0153; LOC 2053.

The segment load shows:

NYC

1156	0.36
on-board passenger	segment load factor

2053

local departure time from NYC

Thus, the sum of outbound passengers (858) and fly-over passengers (298) is equivalent to the on-board passengers (1156) on the NYC-PHI segment; the local departure time from NYC is identified as 2053. The load factor of each segment is not allowed to exceed the critical load factor specified by the user. The program prints four stars (****) to bring the user's attention

to any excessive segment loads.

(6) Load Factor Distribution:

To give an overview of the segment loads, a subroutine for load factor distribution collects segments which have non-zero load factors by 5% increments. It also gives these segments as a percentage of the total legs. For the transcontinental case study, each flight has 10 westbound segments and 9 eastbound segments in its itinerary.

The load factor distribution table gives the load factor in 5% increments from 5% to 100; the percentage of segments that are a load factor smaller than the value of the overall load factor; and the number of those segments. However, if an overload situation occurs, these segments will also be shown in the distribution list.

(7) The Turn Around Execution Procedures:

After the computation and output of the load factor distribution the program provides a message for user's instruction to return the execution to initial step. By simply entering yes/no option, the execution will either be continued or terminated. If termination is requested, the Control Program (CP) will reply with a ready code (R) for the user to "logoff" the system.

Table D1. Relay Scheduling Model

```
C     M.I.T. FLIGHT TRANSPORTATION LABORATORY   ELLIOTT W. LIU          ART00010 ARTS0001
C                                                                       ART00020 ARTS0002
C     TOTAL NUMBER OF PASSENGER DEMAND FOR THE DETERMINATION OF FLIGHT SART00030 ARTS0003
C     AND OVERALL LOAD FACTOR OF AERIAL RELAY TRANSPORTATION SYSTEM     ART00040 ARTS0004
C                                                                       ART00050 ARTS0005
C                                                                       ART00060 ARTS0006
      REAL*8 CITY                                                       ART00070 ARTS0007
      REAL LFW(10,20),LFE(9,20)                                         ART00080 ARTS0008
      REAL*8 LAXIS(111,51),IVX(111)                                     ART00090 ARTS0009
      REAL NG,IVY(51)                                                   ART00100 ARTS0010
      DIMENSION IV(23)                                                  ART00110 ARTS0011
      DIMENSION LSMB(11),FW(10,20),FE(9,20)                             ART00120 ARTS0012
      DIMENSION MSTO(60),CITY(11),IZONE(11),IBKT(4,11),ISHED(4,11),     ART00130 ARTS0013
     1ISHEDL(4,11),ISHEDH(4,11),ISHEDM(4,11),ITIME(41)                  ART00140 ARTS0014
      DIMENSION IFTSH(41),IFTSM(41),LPAXO(41),LPAXI(41),LPOW(11,49),LPIWART00150 ARTS0015
     1(11,49),LPOE(11,49),LPIE(11,49),MLW(10),MLE(9),IDEPRT(20)        ART00160 ARTS0016
      DIMENSION IFLTW(20,11),IFLTLW(20,11),IFLTE(20,11),IFLTLE(20,11)   ART00170 ARTS0017
      DIMENSION MSTOM(49),NPO(11,20),NPI(11,20),ITRAN1(11,20),          ART00180 ARTS0018
     1ITRAN2(11,20),ITMD1(49),ITMD2(49),IFLT(11,20)                     ART00190 ARTS0019
      DIMENSION NPIW(11,20),NPOW(11,20),NPIE(11,20),NPOE(11,20),        ART00200 ARTS0020
     1NPFOW(11,20),NPOBW(10,20),NPFOE(11,20),NPOBE(9,20)                ART00210 ARTS0021
      DIMENSION LPO(11,49),LPI(11,49),IDPH(20),IDPM(20),NAME(4)         ART00220 ARTS0022
C     INPUT 48 TIME POINTS OF A DAY, NAME OF HUB, AND TIME ZONE OF EACH ART00230 ARTS0023
C     CORRESPONDING BLOCK TIME IN EACH FLIGHT AS OF FOUR DIRECTIONS OF FART00240 ARTS0024
C                                                                       ART00250 ARTS0025
      WRITE(6,354)                                                      ART00260 ARTS0026
354   FORMAT(1X,'PLEASE ENTER YOUR NAME PRECEDED BY A BLANK')           ART00270 ARTS0027
      READ(5,355) (NAME(I),I=1,4)                                       ART00280 ARTS0028
355   FORMAT(4A4)                                                       ART00290 ARTS0029
      WRITE(6,356) (NAME(I),I=1,4)                                      ART00300 ARTS0030
356   FORMAT(1X,'HELLO! ',4A4,'WELCOME TO PLAY THE AERIAL',1X,          ART00310 ARTS0031
     1'RELAY TRANSPORTATION SYSTEM')                                    ART00320 ARTS0032
      READ(8,200) (MSTO(M),M=1,49)                                      ART00330 ARTS0033
200   FORMAT(8(I4,6X))                                                  ART00340 ARTS0034
      IRPM=0                                                            ART00350 ARTS0035
      IASM=0                                                            ART00360 ARTS0036
                                                                              PAGE  1
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      IBKTH=0                                                                  ART00370 ARTS0037
      IBKTM=0                                                                  ART00380 ARTS0038
      DO 300 I=1,4                                                             ART00390 ARTS0039
      DO 300 J=1,11                                                            ART00400 ARTS0040
      ISHED(I,J) =0                                                            ART00410 ARTS0041
      ISHEDL(I,J)=0                                                            ART00420 ARTS0042
      ISHEDH(I,J) =0                                                           ART00430 ARTS0043
300   ISHEDM(I,J)=0                                                            ART00440 ARTS0044
      READ(8,400) (CITY(I),IZONE(I),I=1,11)                                    ART00450 ARTS0045
400   FORMAT(11(A3,1X,I1,2X))                                                  ART00460 ARTS0046
      READ(8,401) ((IBKT(I,J),J=1,11),I=1,4)                                   ART00470 ARTS0047
401    FORMAT(11(I3,2X))                                                       ART00480 ARTS0048
      READ(8,402) (MLW(M),M=1,10)                                              ART00490 ARTS0049
402   FORMAT(10(I3,2X))                                                        ART00500 ARTS0050
      READ(8,403) (MLE(N),N=1,9)                                               ART00510 ARTS0051
403   FORMAT(9(I3,2X))                                                         ART00520 ARTS0052
C                                                                              ART00530 ARTS0053
C     COMPUTATION OF PASSENGER DISTRIBUTION OVER 48 TIME INTERVALS IN          ART00540 ARTS0054
C     EACH DIRECTION OF FLIGHT THROUGH 11 HUBS                                 ART00550 ARTS0055
C                                                                              ART00560 ARTS0056
      IDIR=1                                                                   ART00570 ARTS0057
      ITT=1                                                                    ART00580 ARTS0058
      ICODE=1                                                                  ART00590 ARTS0059
74    READ(8,201) (IFTSH(I),IFTSM(I),LPAXO(I),LPAXI(I),I=1,41)                ART00600 ARTS0060
201   FORMAT(6X,I2,I2,6X,I4,6X,I4)                                             ART00610 ARTS0061
      DO 10 K=1,41                                                             ART00620 ARTS0062
      IF(IFTSM(K).EQ.0) GO TO 20                                               ART00630 ARTS0063
      IFTSM(K)=IFTSM(K)-20                                                     ART00640 ARTS0064
20    IFTSH(K)=IFTSH(K)+IZONE(ICODE)                                           ART00650 ARTS0065
21    ITIME(K)=IFTSH(K)*100+IFTSM(K)                                           ART00660 ARTS0066
      IF(ITIME(K).LT.2400) GO TO 14                                            ART00670 ARTS0067
      ITIME(K)=ITIME(K)-2400                                                   ART00680 ARTS0068
 14   DO 11 M=1,49                                                             ART00690 ARTS0069
      IF(ITIME(K).GE.MSTO(M)) GO TO 70                                         ART00700 ARTS0070
      GO TO 11                                                                 ART00710 ARTS0071
70    IF(ITIME(K).LT.MSTO(M+1)) GO TO 27                                       ART00720 ARTS0072
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      GO TO 11                                                          ART00730 ARTS0073
27    GO TO (28,29), ITT                                                ART00740 ARTS0074
28    LPOW(ICODE,M)=LPAXO(K)                                            ART00750 ARTS0075
      LPIW(ICODE,M)=LPAXI(K)                                            ART00760 ARTS0076
      GO TO 10                                                          ART00770 ARTS0077
29    LPOE(ICODE,M)=LPAXO(K)                                            ART00780 ARTS0078
      LPIE(ICODE,M)=LPAXI(K)                                            ART00790 ARTS0079
      GO TO 10                                                          ART00800 ARTS0080
11    CONTINUE                                                          ART00810 ARTS0081
10    CONTINUE                                                          ART00820 ARTS0082
503   ICODE=ICODE+1                                                     ART00830 ARTS0083
      IF(ITT.EQ.2) GO TO 501                                            ART00840 ARTS0084
500   IF(ICODE.EQ.11) GO TO 75                                          ART00850 ARTS0085
      GO TO 74                                                          ART00860 ARTS0086
501   IF(ICODE.EQ.10) GO TO 503                                         ART00870 ARTS0087
      IF(ICODE.EQ.12) GO TO 75                                          ART00880 ARTS0088
      GO TO 74                                                          ART00890 ARTS0089
75    ITT=ITT+1                                                         ART00900 ARTS0090
      IF(ITT.EQ.3) GO TO 1107                                           ART00910 ARTS0091
      ICODE=1                                                           ART00920 ARTS0092
      GO TO 74                                                          ART00930 ARTS0093
C                                                                       ART00940 ARTS0094
C     COMPUTATION OF FLIGHT SCHEDULE FOR EACH CHOOSEN DEPARTURE FROM    ART00950 ARTS0095
C     THE ORIGINAL BASE---BOSTON                                        ART00960 ARTS0096
C     DOUBLE ROUND TRIPS IN EACH FLIGHT                                 ART00970 ARTS0097
C     FLIGHT SCHEDULE OVER EACH HUB                                     ART00980 ARTS0098
1107  KKK=0                                                             ART00990 ARTS0099
      N=0                                                               ART01000 ARTS0100
      M=1                                                               ART01010 ARTS0101
      MM=1                                                              ART01020 ARTS0102
      WRITE(6,359)                                                      ART01030 ARTS0103
359   FORMAT(1X,'ENTER THE NUMBER OF LINER FOR DAILY OPERATION, AND',   ART01040 ARTS0104
     1' THE SEAT CAPACITY & CRITICAL LOAD FACTOR FOR EACH LINER',/,     ART01050 ARTS0105
     21X,'00 0000 0.00')                                                ART01060 ARTS0106
      READ(5,358) K,ISEAT,CR                                            ART01070 ARTS0107
358   FORMAT(I2,1X,I4,1X,F4.2)                                          ART01080 ARTS0108
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      KB=K*2                                                              ART01090 ARTS0109
      WRITE(6,1899)                                                       ART01100 ARTS0110
1899  FORMAT(1X,'TYPE IN 2 DIGIT IN HOUR  &  2 DIGIT IN MIN. OF----------ART01110 ARTS0111
     1THE DESIRED DEPARTURE SCHEDULES (GMT) FROM BOSTON',/,' THEN TYPE--ART01120 ARTS0112
     2THE RETURN KEY AFTER EACH ENTRY. PLEASE NOTE: MORE THAN 3 HR.',   ART01130 ARTS0113
     3/,1X,'SEPARATION BETWEEN ANY TWO ADJACENT FLIGHTS MIGHT CAUSE',   ART01140 ARTS0114
     4' DENIED PASSENGERS')                                             ART01150 ARTS0115
      READ(6,202) (IDPH(KG),IDPM(KG),KG=1,K)                            ART01160 ARTS0116
202   FORMAT(I2,I2)                                                      ART01170 ARTS0117
      WRITE(6,3838)                                                      ART01180 ARTS0118
3838  FORMAT(1X,'DO YOU WANT THE INITIAL DEMAND DATA? YES OR NO')        ART01190 ARTS0119
      READ(5,3839) IDATA                                                 ART01200 ARTS0120
3839  FORMAT(A4)                                                         ART01210 ARTS0121
      DATA NDATA/'YES '/                                                 ART01220 ARTS0122
      IF(IDATA.NE.NDATA) GO TO 3840                                      ART01230 ARTS0123
      WRITE(6,3841)                                                      ART01240 ARTS0124
3841  FORMAT(1X,40X,'WESTBOUND INITIAL DEMAND DATA')                     ART01250 ARTS0125
      WRITE(6,3842)                                                      ART01260 ARTS0126
3842  FORMAT(1X,'GMT',7X,'LAX',7X,'SFO',7X,'DEN',7X,'CHI',7X,'DET',7X,   ART01270 ARTS0127
     1'CLE',7X,'PIT',7X,'WAS',7X,'PHI',7X,'NYC',7X,'BOS',/,1X,          ART01280 ARTS0128
     2'TIME',2X,11(1X,'OUTB',1X,'INBD'))                                ART01290 ARTS0129
      DO 3851 J=1,48                                                     ART01300 ARTS0130
      WRITE(6,3844) MSTO(J),LPOW(11,J),LPIW(11,J),LPOW(10,J),            ART01310 ARTS0131
     1LPIW(10,J),LPOW(9,J),LPIW(9,J),LPOW(8,J),LPIW(8,J),LPOW(7,J),     ART01320 ARTS0132
     2LPIW(7,J),LPOW(6,J),LPIW(6,J),LPOW(5,J),LPIW(5,J),                ART01330 ARTS0133
     3LPOW(4,J),LPIW(4,J),LPOW(3,J),LPIW(3,J),LPOW(2,J),LPIW(2,J),      ART01340 ARTS0134
     4LPOW(1,J),LPIW(1,J)                                               ART01350 ARTS0135
3844  FORMAT(1X,I4,2X,11(1X,I4,1X,I4))                                   ART01360 ARTS0136
3851  CONTINUE                                                           ART01370 ARTS0137
      WRITE(6,3845)                                                      ART01380 ARTS0138
3845  FORMAT(//,41X,'EASTBOUND INITIAL DEMAND DATA')                     ART01390 ARTS0139
      WRITE(6,3842)                                                      ART01400 ARTS0140
      DO 3852 J=1,48                                                     ART01410 ARTS0141
      WRITE(6,3844) MSTO(J),LPOE(11,J),LPIE(11,J),LPOE(10,J),LPIE(10,J),ART01420 ARTS0142
     2LPOE(9,J),LPIE(9,J),LPOE(8,J),LPIE(8,J),LPOE(7,J),LPIE(7,J),      ART01430 ARTS0143
     3LPOE(6,J),LPIE(6,J),LPOE(5,J),LPIE(5,J),LPOE(4,J),LPIE(4,J),      ART01440 ARTS0144
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     4LPOE(3,J),LPIE(3,J),LPOE(2,J),LPIE(2,J),LPOE(1,J),LPIE(1,J)          ART01450 ARTS0145
3852  CONTINUE                                                             ART01460 ARTS0146
3840  WRITE(6,2060)                                                        ART01470 ARTS0147
2060  FORMAT(1X,'DO YOU WANT THE FLIGHT SCHEDULE OF EACH LINER? YES OR NART01480 ARTS0148
     1O?')                                                                 ART01490 ARTS0149
      READ(5,2061) LFTB                                                    ART01500 ARTS0150
2061  FORMAT(A4)                                                           ART01510 ARTS0151
      DATA NLFTB/'YES '/                                                   ART01520 ARTS0152
      IF(LFTB.EQ.NLFTB) GO TO 2100                                         ART01530 ARTS0153
      GO TO 2063                                                           ART01540 ARTS0154
2100  WRITE(6,2062)                                                        ART01550 ARTS0155
2062  FORMAT(1X,'THE LINER FLIGHT SCHEDULE IS TABULATED FOR TWO',          ART01560 ARTS0156
     1' DOUBLE ROUND TRIP.',/,1X,'THE FIRST DEPARTURE OF LINER FROM BOSTARTO1570 ARTS0157
     2ON PERFORMS WESTBOUND FLIGHT TO LOS ANGELES, THEN TURNING EAST',    ART01580 ARTS0158
     3'BOUND TO BOSTON')                                                  ART01590 ARTS0159
2063  DO 151 MK=1,K                                                        ART01600 ARTS0160
      IBKTH=IDPH(MK)                                                       ART01610 ARTS0161
      IBKTM=IDPM(MK)                                                       ART01620 ARTS0162
      N=N+1                                                                ART01630 ARTS0163
      NEND=N                                                               ART01640 ARTS0164
      IDEPRT(N)=IBKTH*100+IBKTM                                            ART01650 ARTS0165
      DO 150 IDIR=1,4                                                      ART01660 ARTS0166
73    GO TO (32,33,32,33), IDIR                                            ART01670 ARTS0167
32    L=0                                                                  ART01680 ARTS0168
      GO TO 71                                                             ART01690 ARTS0169
33    L=12                                                                 ART01700 ARTS0170
71    DO 1 I=1,11                                                          ART01710 ARTS0171
      GO TO (30,31,30,31), IDIR                                            ART01720 ARTS0172
30    L=L+1                                                                ART01730 ARTS0173
      ID=I                                                                 ART01740 ARTS0174
      GO TO 9                                                              ART01750 ARTS0175
31    L=L-1                                                                ART01760 ARTS0176
      ID=12-I                                                              ART01770 ARTS0177
9     IBKTM=IBKTM+IBKT(IDIR,ID)                                            ART01780 ARTS0178
      IF(IBKTM.LT.60) GO TO 2                                              ART01790 ARTS0179
      IF(IBKTM.GE.120) GO TO 3                                             ART01800 ARTS0180
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      IBKTH=IBKTH+1                                                          ART01810 ARTS0181
      IBKTM=IBKTM-60                                                         ART01820 ARTS0182
      GO TO 2                                                                ART01830 ARTS0183
3     IBKTH=IBKTH+2                                                          ART01840 ARTS0184
      IBKTM=IBKTM-120                                                        ART01850 ARTS0185
2     ISHEDH(IDIR,ID)=IBKTH                                                  ART01860 ARTS0186
      IF(ISHEDH(IDIR,ID).LT.24) GO TO 4                                      ART01870 ARTS0187
      ISHEDH(IDIR,ID)=ISHEDH(IDIR,ID)-24                                     ART01880 ARTS0188
4     ISHEDM(IDIR,ID)=IBKTM                                                  ART01890 ARTS0189
      ISHED(IDIR,ID)=ISHEDH(IDIR,ID)*100+ISHEDM(IDIR,ID)                     ART01900 ARTS0190
      ISHEDL(IDIR,ID)=ISHED(IDIR,ID)-IZONE(L)*100                            ART01910 ARTS0191
      IF(ISHEDL(IDIR,ID).GE.0) GO TO 8                                       ART01920 ARTS0192
      ISHEDL(IDIR,ID)=ISHEDL(IDIR,ID)+2400                                   ART01930 ARTS0193
8     GO TO (5,6,5,6), IDIR                                                  ART01940 ARTS0194
5     ISHED(IDIR,11)=0                                                       ART01950 ARTS0195
      ISHEDL(IDIR,11)=0                                                      ART01960 ARTS0196
      GO TO 1                                                                ART01970 ARTS0197
6     ISHED(IDIR,10)=0                                                       ART01980 ARTS0198
      ISHEDL(IDIR,10)=0                                                      ART01990 ARTS0199
1     CONTINUE                                                               ART02000 ARTS0200
150   CONTINUE                                                               ART02010 ARTS0201
      IF(LFTB.EQ.NLFTB) GO TO 2101                                           ART02020 ARTS0202
      GO TO 2102                                                             ART02030 ARTS0203
2101  WRITE(6,950) IDEPRT(N)                                                 ART02040 ARTS0204
950   FORMAT('1',20X,'FLIGHT SCHEDULE OF LINER FIRST DEPARTURE',             ART02050 ARTS0205
     1' FROM BOSTON AT GMT ',I4)                                             ART02060 ARTS0206
      WRITE(6,955)                                                           ART02070 ARTS0207
955   FORMAT(5X,'LAX',7X,'SFO',7X,'DEN',7X,                                  ART02080 ARTS0208
     2'CHI',7X,'DET',7X,'CLE',7X,'PIT',7X,'WAS',7X,'PHI',7X,'NYC',           ART02090 ARTS0209
     37X,'BOS',/,1X,11(2X,'GMT',2X,'LOC'))                                   ART02100 ARTS0210
      DO 731 IDIR=1,4                                                        ART02110 ARTS0211
      PRINT204,ISHED(IDIR,11),ISHEDL(IDIR,11),                               ART02120 ARTS0212
     1         ISHED(IDIR,10),ISHEDL(IDIR,10),                               ART02130 ARTS0213
     1         ISHED(IDIR,9),ISHEDL(IDIR,9),                                 ART02140 ARTS0214
     1         ISHED(IDIR,8),ISHEDL(IDIR,8),                                 ART02150 ARTS0215
     1         ISHED(IDIR,7),ISHEDL(IDIR,7),                                 ART02160 ARTS0216
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     1          ISHED(IDIR,6),ISHEDL(IDIR,6),                          ART02170 ARTS0217
     1          ISHED(IDIR,5),ISHEDL(IDIR,5),                          ART02180 ARTS0218
     1          ISHED(IDIR,4),ISHEDL(IDIR,4),                          ART02190 ARTS0219
     1          ISHED(IDIR,3),ISHEDL(IDIR,3),                          ART02200 ARTS0220
     1          ISHED(IDIR,2),ISHEDL(IDIR,2),                          ART02210 ARTS0221
     1          ISHED(IDIR,1),ISHEDL(IDIR,1)                           ART02220 ARTS0222
204    FORMAT(1X,11(1X,I4,1X,I4))                                       ART02230 ARTS0223
731    CONTINUE                                                         ART02240 ARTS0224
2102   DO 152 IDIR=1,4                                                  ART02250 ARTS0225
       DO 152 ID=1,11                                                   ART02260 ARTS0226
       GO TO (157,158,159,160), IDIR                                    ART02270 ARTS0227
157    IFLTW(IDIR+KKK,ID)=ISHED(IDIR,ID)                                ART02280 ARTS0228
       IFLTLW(IDIR+KKK,ID)=ISHEDL(IDIR,ID)                              ART02290 ARTS0229
       GO TO 152                                                        ART02300 ARTS0230
158    IFLTE(IDIR-1+KKK,ID)=ISHED(IDIR,ID)                              ART02310 ARTS0231
       IFLTLE(IDIR-1+KKK,ID)=ISHEDL(IDIR,ID)                            ART02320 ARTS0232
       GO TO 152                                                        ART02330 ARTS0233
159    IFLTW(IDIR-1+KKK,ID)=ISHED(IDIR,ID)                              ART02340 ARTS0234
       IFLTLW(IDIR-1+KKK,ID)=ISHEDL(IDIR,ID)                            ART02350 ARTS0235
       GO TO 152                                                        ART02360 ARTS0236
160    IFLTE(IDIR-2+KKK,ID)=ISHED(IDIR,ID)                              ART02370 ARTS0237
       IFLTLE(IDIR-2+KKK,ID)=ISHEDL(IDIR,ID)                            ART02380 ARTS0238
152    CONTINUE                                                         ART02390 ARTS0239
       KKK=KKK+2                                                        ART02400 ARTS0240
151    CONTINUE                                                         ART02410 ARTS0241
C                                                                       ART02420 ARTS0242
C      OUTPUT FLIGHT SCHEDULE ON FLYING OVER EACH HUB                   ART02430 ARTS0243
C                                                                       ART02440 ARTS0244
C                                                                       ART02450 ARTS0245
C      COMPUTATION OF TOTAL ON BOARD, OUTBOUND, AND INBOUND PASSENGERS FOART02460 ARTS0246
C      EACH FLIGHT                                                      ART02470 ARTS0247
C      CHOOSEN INTERVALS OF EACH FLIGHT ON THE BASE AT BOSTON           ART02480 ARTS0248
C                                                                       ART02490 ARTS0249
       DO 1814 L=1,11                                                   ART02500 ARTS0250
       DO 1814 N=1,KB                                                   ART02510 ARTS0251
       IFLT(L,N)=IFLTW(N,L)                                             ART02520 ARTS0252
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1814.  CONTINUE                                                          ART02530 ARTS0253
       DO 6000 M=1,11                                                    ART02540 ARTS0254
       DO 6000 N=1,48                                                    ART02550 ARTS0255
       LPO(M,N)=0                                                        ART02560 ARTS0256
       LPI(M,N)=0                                                        ART02570 ARTS0257
6000   CONTINUE                                                          ART02580 ARTS0258
       WRITE(6,3846)                                                     ART02590 ARTS0259
3846   FORMAT(1X,'DO YOU WNAT THE DEMAND ALLOCATION OF EACH FLIGHT?',    ART02600 ARTS0260
      1' YES OR NO')                                                     ART02610 ARTS0261
       READ (5,3839) LOCAT                                               ART02620 ARTS0262
       IBOND=1                                                           ART02630 ARTS0263
       DO 1815 M=1,11                                                    ART02640 ARTS0264
       DO 1815 N=1,48                                                    ART02650 ARTS0265
       LPO(M,N)=LPOW(M,N)                                                ART02660 ARTS0266
       LPI(M,N)=LPIW(M,N)                                                ART02670 ARTS0267
1815   CONTINUE                                                          ART02680 ARTS0268
C      DESIRABILITY FUNCTION TO DETERMINE TRAFFIC LOAD                   ART02690 ARTS0269
       DATA MSTO(50)/0030/,MSTO(51)/0100/,MSTO(52)/0130/,                ART02700 ARTS0270
      1MSTO(53)/0200/,MSTO(54)/0230/,MSTO(55)/0300/,MSTO(56)/0330/,      ART02710 ARTS0271
      2MSTO(57)/0400/,MSTO(58)/0430/,MSTO(59)/0500/,MSTO(60)/0530/       ART02720 ARTS0272
1835   DO 1816 I=1,11                                                    ART02730 ARTS0273
       DO 1816 J=1,KB                                                    ART02740 ARTS0274
       ITRAN1(I,J)=IFLT(I,J)/100*100                                     ART02750 ARTS0275
       ITRAN2(I,J)=IFLT(I,J)-ITRAN1(I,J)                                 ART02760 ARTS0276
       ITRAN1(I,J)=ITRAN1(I,J)/100                                       ART02770 ARTS0277
1816   CONTINUE                                                          ART02780 ARTS0278
       DO 86 I=1,11                                                      ART02790 ARTS0279
       DO 86 J=1,KB                                                      ART02800 ARTS0280
       NPO(I,J)=0                                                        ART02810 ARTS0281
       NPI(I,J)=0                                                        ART02820 ARTS0282
86     CONTINUE                                                          ART02830 ARTS0283
       DATA LSMB(1)/'BOS'/,LSMB(2)/'NYC'/,LSMB(3)/'PHI'/,LSMB(4)/'WAS'/, ART02840 ARTS0284
      1LSMB(5)/'PIT'/,LSMB(6)/'CLE'/,LSMB(7)/'DET'/,LSMB(8)/'CHI'/,      ART02850 ARTS0285
      2LSMB(9)/'DEN'/,LSMB(10)/'SFO'/,LSMB(11)/'LAX'/                    ART02860 ARTS0286
       DO 1818 IKO=1,11                                                  ART02870 ARTS0287
       IF(IBOND.EQ.1) GO TO 1838                                         ART02880 ARTS0288
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      I=12-IKO                                                                  ART02890 ARTS0289
      IF(LOCAT.NE.NDATA) GO TO 8801                                             ART02900 ARTS0290
      WRITE(6,3855)                                                             ART02910 ARTS0291
3855  FORMAT(//,5X,'EASTBOUND FLIGHTS')                                         ART02920 ARTS0292
      GO TO 8801                                                                ART02930 ARTS0293
1838  I=IKO                                                                     ART02940 ARTS0294
      IF(LOCAT.NE.NDATA) GO TO 8801                                             ART02950 ARTS0295
      WRITE(6,3856)                                                             ART02960 ARTS0296
3856  FORMAT(//,5X,'WESTBOUND FLIGHTS')                                         ART02970 ARTS0297
8801  IF(LOCAT.NE.NDATA) GO TO 3847                                             ART02980 ARTS0298
      WRITE(6,3848) LSMB(I)                                                     ART02990 ARTS0299
3848  FORMAT(32X,A3,3X,'FLT1',1X,'FLT2',1X,'SEP.TIME',                          ART03000 ARTS0300
     91X,'OB#1',1X,'IN#1',1X,'OB#2',1X,'IN#2')                                  ART03010 ARTS0301
3847  DO 3858 J=1,KB                                                           ART03020 ARTS0302
      DO 1820 J2=1,KB                                                           ART03030 ARTS0303
      IF(J.EQ.J2) GO TO 1820                                                    ART03040 ARTS0304
      IDT=ITRAN1(I,J2)*60+ITRAN2(I,J2)-(ITRAN1(I,J)*60+ITRAN2(I,J))             ART03050 ARTS0305
      IF(IDT.GT.0) GO TO 3998                                                   ART03060 ARTS0306
      IDT=(ITRAN1(I,J2)+24)*60+ITRAN2(I,J2)-(ITRAN1(I,J)*60+ITRAN2(I,J          ART03070 ARTS0307
     1))                                                                        ART03080 ARTS0308
3998  IF(IDT.GT.180) GO TO 1820                                                 ART03090 ARTS0309
      IF(IDT.GT.150) GO TO 4002                                                 ART03100 ARTS0310
      IF(IDT.GT.120) GO TO 4003                                                 ART03110 ARTS0311
      IF(IDT.GT.90) GO TO 4004                                                  ART03120 ARTS0312
      IF(IDT.GT.60) GO TO 4005                                                  ART03130 ARTS0313
      IF(IDT.GT.30) GO TO 4006                                                  ART03140 ARTS0314
      DO 4007 N30=1,49                                                          ART03150 ARTS0315
      IF(IFLT(I,J).GE.MSTO(N30)) GO TO 4008                                     ART03160 ARTS0316
      GO TO 4007                                                                ART03170 ARTS0317
4008  IF(IFLT(I,J).LT.MSTO(N30+1)) GO TO 4009                                   ART03180 ARTS0318
      GO TO 4007                                                                ART03190 ARTS0319
4009  MP=N30+1                                                                  ART03200 ARTS0320
      IF(MP.GT.48) GO TO 6100                                                   ART03210 ARTS0321
      IF(IFLT(I,J).EQ.MSTO(N30)) GO TO 4010                                     ART03220 ARTS0322
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4033                                     ART03230 ARTS0323
      GO TO 4010                                                                ART03240 ARTS0324
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6100  MP=MP-48                                                          ART03250 ARTS0325
      IF(IFLT(I,J).EQ.MSTO(N30)) GO TO 4010                             ART03260 ARTS0326
      IF(MSTO(N30+1).EQ.2400) GO TO 3600                                ART03270 ARTS0327
      IF(IFLT(I,J2).GT.MSTO(N30+1)) GO TO 4033                          ART03280 ARTS0328
      GO TO 4010                                                        ART03290 ARTS0329
3600  IF(2400-IFLT(I,J2).GT.2370) GO TO 4033                            ART03300 ARTS0330
      GO TO 4010                                                        ART03310 ARTS0331
4033  NPO(I,J)=NPO(I,J)+LPO(I,N30)                                      ART03320 ARTS0332
      NPI(I,J)=NPI(I,J)+LPI(I,N30)                                      ART03330 ARTS0333
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)                                     ART03340 ARTS0334
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)                                     ART03350 ARTS0335
      LPO(I,N30)=0                                                      ART03360 ARTS0336
      LPI(I,N30)=0                                                      ART03370 ARTS0337
      LPO(I,MP)=0                                                       ART03380 ARTS0338
      LPI(I,MP)=0                                                       ART03390 ARTS0339
      GO TO 3999                                                        ART03400 ARTS0340
4010  NPO(I,J)=NPO(I,J)+LPO(I,N30)/2                                    ART03410 ARTS0341
      NPI(I,J)=NPI(I,J)+LPI(I,N30)/2                                    ART03420 ARTS0342
      NPO(I,J2)=NPO(I,J2)+LPO(I,N30)/2                                  ART03430 ARTS0343
      NPI(I,J2)=NPI(I,J2)+LPI(I,N30)/2                                  ART03440 ARTS0344
      LPO(I,N30)=0                                                      ART03450 ARTS0345
      LPI(I,N30)=0                                                      ART03460 ARTS0346
      GO TO 3999                                                        ART03470 ARTS0347
4007  CONTINUE                                                          ART03480 ARTS0348
4006  DO 4011 N36=1,49                                                  ART03490 ARTS0349
      IF(IFLT(I,J).GE.MSTO(N36)) GO TO 4012                             ART03500 ARTS0350
      GO TO 4011                                                        ART03510 ARTS0351
4012  IF(IFLT(I,J).LT.MSTO(N36+1)) GO TO 4013                           ART03520 ARTS0352
      GO TO 4011                                                        ART03530 ARTS0353
4013  MP=N36+2                                                          ART03540 ARTS0354
      MPP1=MP-1                                                         ART03550 ARTS0355
      IF(MP.GT.48) GO TO 6101                                           ART03560 ARTS0356
      IF(IFLT(I,J).EQ.MSTO(N36)) GO TO 4014                             ART03570 ARTS0357
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4035                             ART03580 ARTS0358
      GO TO 4014                                                        ART03590 ARTS0359
6101  MP=MP-48                                                          ART03600 ARTS0360
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      IF(MPP1.GT.48)  MPP1=MPP1-48                                      ART03610 ARTS0361
      IF (IFLT(I,J).EQ.MSTO(N36)) GO TO 4014                            ART03620 ARTS0362
      IF(MSTO(N36+2).EQ.2400)  GO TO 3601                               ART03630 ARTS0363
      IF (IFLT(I,J2).GT.MSTO(N36+2)) GO TO 4035                         ART03640 ARTS0364
      GO TO 4014                                                        ART03650 ARTS0365
3601  IF(2400-IFLT(I,J2).GT.2370) GO TO 4035                            ART03660 ARTS0366
      GO TO 4014                                                        ART03670 ARTS0367
4035  NPO(I,J)=NPO(I,J)+LPO(I,N36)+LPO(I,MPP1)/2                        ART03680 ARTS0368
      NPI(I,J)=NPI(I,J)+LPI(I,N36)+LPI(I,MPP1)/2                        ART03690 ARTS0369
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)+LPO(I,MPP1)/2                       ART03700 ARTS0370
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)+LPI(I,MPP1)/2                       ART03710 ARTS0371
      LPO(I,N36)=0                                                      ART03720 ARTS0372
      LPI(I,N36)=0                                                      ART03730 ARTS0373
      LPO(I,MPP1)=0                                                     ART03740 ARTS0374
      LPI(I,MPP1)=0                                                     ART03750 ARTS0375
      LPO(I,MP)=0                                                       ART03760 ARTS0376
      LPI(I,MP)=0                                                       ART03770 ARTS0377
      GO TO 3999                                                        ART03780 ARTS0378
4014  NPO(I,J)=NPO(I,J)+LPO(I,N36)                                      ART03790 ARTS0379
      NPI(I,J)=NPI(I,J)+LPI(I,N36)                                      ART03800 ARTS0380
      NPO(I,J2)=NPO(I,J2)+LPO(I,MPP1)                                   ART03810 ARTS0381
      NPI(I,J2)=NPI(I,J2)+LPI(I,MPP1)                                   ART03820 ARTS0382
      LPO(I,N36)=0                                                      ART03830 ARTS0383
      LPI(I,N36)=0                                                      ART03840 ARTS0384
      LPO(I,MPP1)=0                                                     ART03850 ARTS0385
      LPI(I,MPP1)=0                                                     ART03860 ARTS0386
      GO TO 3999                                                        ART03870 ARTS0387
4011  CONTINUE                                                          ART03880 ARTS0388
4005  DO 4015 N69=1,49                                                  ART03890 ARTS0389
      IF(IFLT(I,J).GE.MSTO(N69)) GO TO 4016                             ART03900 ARTS0390
      GO TO 4015                                                        ART03910 ARTS0391
4016  IF(IFLT(I,J).LT.MSTO(N69+1)) GO TO 4017                           ART03920 ARTS0392
      GO TO 4015                                                        ART03930 ARTS0393
4017  MP=N69+3                                                          ART03940 ARTS0394
      MPP1=MP-1                                                         ART03950 ARTS0395
      MPP2=MP-2                                                         ART03960 ARTS0396
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      IF(MP.GT.48) GO TO 6102                                                    ART03970 ARTS0397
      IF(IFLT(I,J).EQ.MSTO(N69)) GO TO 4018                                      ART03980 ARTS0398
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4037                                      ART03990 ARTS0399
      GO TO 4018                                                                 ART04000 ARTS0400
6102  MP=MP-48                                                                   ART04010 ARTS0401
      IF(MPP1.GT.48)  MPP1=MPP1-48                                               ART04020 ARTS0402
      IF(MPP2.GT.48)  MPP2=MPP2-48                                               ART04030 ARTS0403
      IF(IFLT(I,J).EQ.MSTO(N69)) GO TO 4018                                      ART04040 ARTS0404
      IF(MSTO(N69+3).EQ.2400) GO TO 3602                                         ART04050 ARTS0405
      IF(IFLT(I,J2).GT.MSTO(N69+3)) GO TO 4037                                   ART04060 ARTS0406
      GO TO 4018                                                                 ART04070 ARTS0407
3602  IF(2400-IFLT(I,J2).GT.2370) GO TO 4037                                     ART04080 ARTS0408
      GO TO 4018                                                                 ART04090 ARTS0409
4037  NPO(I,J)=NPO(I,J)+LPO(I,N69)+LPO(I,MPP2)*2/3+LPO(I,MPP1)/3                 ART04100 ARTS0410
      NPI(I,J)=NPI(I,J)+LPI(I,N69)+LPI(I,MPP2)*2/3+LPI(I,MPP1)/3                 ART04110 ARTS0411
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)+LPO(I,MPP1)*2/3+LPO(I,MPP2)/3                ART04120 ARTS0412
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)+LPI(I,MPP1)*2/3+LPI(I,MPP2)/3                ART04130 ARTS0413
      LPO(I,N69)=0                                                               ART04140 ARTS0414
      LPI(I,N69)=0                                                               ART04150 ARTS0415
      LPO(I,MP)=0                                                                ART04160 ARTS0416
      LPI(I,MP)=0                                                                ART04170 ARTS0417
      LPO(I,MPP1)=0                                                              ART04180 ARTS0418
      LPI(I,MPP1)=0                                                              ART04190 ARTS0419
      LPO(I,MPP2)=0                                                              ART04200 ARTS0420
      LPI(I,MPP2)=0                                                              ART04210 ARTS0421
      GO TO 3999                                                                 ART04220 ARTS0422
4018  NPO(I,J)=NPO(I,J)+LPO(I,N69)+LPO(I,MPP2)/2                                 ART04230 ARTS0423
      NPI(I,J)=NPI(I,J)+LPI(I,N69)+LPI(I,MPP2)/2                                 ART04240 ARTS0424
      NPO(I,J2)=NPO(I,J2)+LPO(I,MPP1)+LPO(I,MPP2)/2                              ART04250 ARTS0425
      NPI(I,J2)=NPI(I,J2)+LPI(I,MPP1)+LPI(I,MPP2)/2                              ART04260 ARTS0426
      LPO(I,N69)=0                                                               ART04270 ARTS0427
      LPI(I,N69)=0                                                               ART04280 ARTS0428
      LPO(I,MPP1)=0                                                              ART04290 ARTS0429
      LPI(I,MPP1)=0                                                              ART04300 ARTS0430
      LPO(I,MPP2)=0                                                              ART04310 ARTS0431
      LPI(I,MPP2)=0                                                              ART04320 ARTS0432
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      GO TO 3999                                                                ART04330 ARTS0433
4015  CONTINUE                                                                  ART04340 ARTS0434
4004  DO 4019 N912=1,49                                                         ART04350 ARTS0435
      IF(IFLT(I,J).GE.MSTO(N912)) GO TO 4057                                    ART04360 ARTS0436
      GO TO 4019                                                                ART04370 ARTS0437
4057  IF(IFLT(I,J).LT.MSTO(N912+1)) GO TO 4021                                  ART04380 ARTS0438
      GO TO 4019                                                                ART04390 ARTS0439
4021  MP=N912+4                                                                 ART04400 ARTS0440
      MPP1=MP-1                                                                 ART04410 ARTS0441
      MPP2=MP-2                                                                 ART04420 ARTS0442
      MPP3=MP-3                                                                 ART04430 ARTS0443
      IF(MP.GT.48) GO TO 6103                                                   ART04440 ARTS0444
      IF(IFLT(I,J).EQ.MSTO(N912)) GO TO 4022                                    ART04450 ARTS0445
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4039                                     ART04460 ARTS0446
      GO TO 4022                                                                ART04470 ARTS0447
6103  MP=MP-48                                                                  ART04480 ARTS0448
      IF(MPP1.GT.48) MPP1=MPP1-48                                               ART04490 ARTS0449
      IF(MPP2.GT.48) MPP2=MPP2-48                                               ART04500 ARTS0450
      IF(MPP3.GT.48) MPP3=MPP3-48                                               ART04510 ARTS0451
      IF(IFLT(I,J).EQ.MSTO(N912)) GO TO 4022                                    ART04520 ARTS0452
      IF(MSTO(N912+4).EQ.2400) GO TO 3603                                       ART04530 ARTS0453
      IF(IFLT(I,J2).GT.MSTO(N912+4)) GO TO 4039                                 ART04540 ARTS0454
      GO TO 4022                                                                ART04550 ARTS0455
3603  IF(2400-IFLT(I,J2).GT.2370) GO TO 4039                                    ART04560 ARTS0456
      GO TO 4022                                                                ART04570 ARTS0457
4039  NPO(I,J)=NPO(I,J)+LPO(I,N912)+LPO(I,MPP3)+LPO(I,MPP2)/2                   ART04580 ARTS0458
      NPI(I,J)=NPI(I,J)+LPI(I,N912)+LPI(I,MPP3)+LPI(I,MPP2)/2                   ART04590 ARTS0459
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)+LPO(I,MPP1)+LPO(I,MPP2)/2                   ART04600 ARTS0460
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)+LPI(I,MPP1)+LPI(I,MPP2)/2                   ART04610 ARTS0461
      LPO(I,N912)=0                                                             ART04620 ARTS0462
      LPI(I,N912)=0                                                             ART04630 ARTS0463
      LPO(I,MP)=0                                                               ART04640 ARTS0464
      LPI(I,MP)=0                                                               ART04650 ARTS0465
      LPO(I,MPP1)=0                                                             ART04660 ARTS0466
      LPI(I,MPP1)=0                                                             ART04670 ARTS0467
      LPO(I,MPP2)=0                                                             ART04680 ARTS0468
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      LPI(I,MPP2)=0                                                                  ART04690 ARTS0469
      LPO(I,MPP3)=0                                                                  ART04700 ARTS0470
      LPI(I,MPP3)=0                                                                  ART04710 ARTS0471
      GO TO 3999                                                                     ART04720 ARTS0472
4022  NPO(I,J)=NPO(I,J)+LPO(I,N912)+LPO(I,MPP3)*2/3+LPO(I,MPP2)/3                    ART04730 ARTS0473
      NPI(I,J)=NPI(I,J)+LPI(I,N912)+LPI(I,MPP3)*2/3+LPI(I,MPP2)/3                    ART04740 ARTS0474
      NPO(I,J2)=NPO(I,J2)+LPO(I,MPP1)+LPO(I,MPP2)*2/3+LPO(I,MPP3)/3                  ART04750 ARTS0475
      NPI(I,J2)=NPI(I,J2)+LPI(I,MPP1)+LPI(I,MPP2)*2/3+LPI(I,MPP3)/3                  ART04760 ARTS0476
      LPO(I,N912)=0                                                                  ART04770 ARTS0477
      LPI(I,N912)=0                                                                  ART04780 ARTS0478
      LPO(I,MPP1)=0                                                                  ART04790 ARTS0479
      LPI(I,MPP1)=0                                                                  ART04800 ARTS0480
      LPO(I,MPP2)=0                                                                  ART04810 ARTS0481
      LPI(I,MPP2)=0                                                                  ART04820 ARTS0482
      LPO(I,MPP3)=0                                                                  ART04830 ARTS0483
      LPI(I,MPP3)=0                                                                  ART04840 ARTS0484
      GO TO 3999                                                                     ART04850 ARTS0485
4019  CONTINUE                                                                       ART04860 ARTS0486
4003  DO 4023 N1215=1,49                                                             ART04870 ARTS0487
      IF(IFLT(I,J).GE.MSTO(N1215)) GO TO 4024                                        ART04880 ARTS0488
      GO TO 4023                                                                     ART04890 ARTS0489
4024  IF(IFLT(I,J).LT.MSTO(N1215+1)) GO TO 4025                                      ART04900 ARTS0490
      GO TO 4023                                                                     ART04910 ARTS0491
4025  MP=N1215+5                                                                     ART04920 ARTS0492
      MPP1=MP-1                                                                      ART04930 ARTS0493
      MPP2=MP-2                                                                      ART04940 ARTS0494
      MPP3=MP-3                                                                      ART04950 ARTS0495
      MPP4=MP-4                                                                      ART04960 ARTS0496
      IF(MP.GT.48) GO TO 6104                                                        ART04970 ARTS0497
      IF(IFLT(I,J).EQ.MSTO(N1215)) GO TO 4026                                        ART04980 ARTS0498
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4041                                          ART04990 ARTS0499
      GO TO 4026                                                                     ART05000 ARTS0500
6104  MP=MP-48                                                                       ART05010 ARTS0501
      IF(MPP1.GT.48) MPP1=MPP1-48                                                    ART05020 ARTS0502
      IF(MPP2.GT.48) MPP2=MPP2-48                                                    ART05030 ARTS0503
      IF(MPP3.GT.48) MPP3=MPP3-48                                                    ART05040 ARTS0504
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      IF(MPP4.GT.48) MPP4=MPP4-48                                                ART05050 ARTS0505
      IF(IFLT(I,J).EQ.MSTO(N1215)) GO TO 4026                                    ART05060 ARTS0506
      IF(MSTO(N1215+5).EQ.2400) GO TO 3604                                       ART05070 ARTS0507
      IF(IFLT(I,J2).GT.MSTO(N1215+5)) GO TO 4041                                 ART05080 ARTS0508
      GO TO 4026                                                                 ART05090 ARTS0509
3604  IF(2400-IFLT(I,J2).GT.2370) GO TO 4041                                     ART05100 ARTS0510
      GO TO 4026                                                                 ART05110 ARTS0511
4041  NPO(I,J)=NPO(I,J)+LPO(I,N1215)+LPO(I,MPP4)+LPO(I,MPP3)                     ART05120 ARTS0512
      NPI(I,J)=NPI(I,J)+LPI(I,N1215)+LPI(I,MPP4)+LPI(I,MPP3)                     ART05130 ARTS0513
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)+LPO(I,MPP1)+LPO(I,MPP2)                      ART05140 ARTS0514
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)+LPI(I,MPP1)+LPI(I,MPP2)                      ART05150 ARTS0515
      LPO(I,N1215)=0                                                             ART05160 ARTS0516
      LPI(I,N1215)=0                                                             ART05170 ARTS0517
      LPO(I,MP)=0                                                                ART05180 ARTS0518
      LPI(I,MP)=0                                                                ART05190 ARTS0519
      LPO(I,MPP1)=0                                                              ART05200 ARTS0520
      LPI(I,MPP1)=0                                                              ART05210 ARTS0521
      LPO(I,MPP2)=0                                                              ART05220 ARTS0522
      LPI(I,MPP2)=0                                                              ART05230 ARTS0523
      LPO(I,MPP3)=0                                                              ART05240 ARTS0524
      LPI(I,MPP3)=0                                                              ART05250 ARTS0525
      LPO(I,MPP4)=0                                                              ART05260 ARTS0526
      LPI(I,MPP4)=0                                                              ART05270 ARTS0527
      GO TO 3999                                                                 ART05280 ARTS0528
4026  NPO(I,J)=NPO(I,J)+LPO(I,N1215)+LPO(I,MPP4)+LPO(I,MPP3)/2                   ART05290 ARTS0529
      NPI(I,J)=NPI(I,J)+LPI(I,N1215)+LPI(I,MPP4)+LPI(I,MPP3)/2                   ART05300 ARTS0530
      NPO(I,J2)=NPO(I,J2)+LPO(I,MPP1)+LPO(I,MPP2)+LPO(I,MPP3)/2                  ART05310 ARTS0531
      NPI(I,J2)=NPI(I,J2)+LPI(I,MPP1)+LPI(I,MPP2)+LPI(I,MPP3)/2                  ART05320 ARTS0532
      LPO(I,N1215)=0                                                             ART05330 ARTS0533
      LPI(I,N1215)=0                                                             ART05340 ARTS0534
      LPO(I,MPP1)=0                                                              ART05350 ARTS0535
      LPI(I,MPP1)=0                                                              ART05360 ARTS0536
      LPO(I,MPP2)=0                                                              ART05370 ARTS0537
      LPI(I,MPP2)=0                                                              ART05380 ARTS0538
      LPO(I,MPP3)=0                                                              ART05390 ARTS0539
      LPI(I,MPP3)=0                                                              ART05400 ARTS0540
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      LPO(I,MPP4)=0                                                                  ART05410 ARTS0541
      LPI(I,MPP4)=0                                                                  ART05420 ARTS0542
      GO TO 3999                                                                     ART05430 ARTS0543
4023  CONTINUE                                                                       ART05440 ARTS0544
4002  DO 4027 N1518=1,49                                                             ART05450 ARTS0545
      IF(IFLT(I,J).GE.MSTO(N1518)) GO TO 4028                                        ART05460 ARTS0546
      GO TO 4027                                                                     ART05470 ARTS0547
4028  IF(IFLT(I,J).LT.MSTO(N1518+1)) GO TO 4029                                      ART05480 ARTS0548
      GO TO 4027                                                                     ART05490 ARTS0549
4029  MP=N1518+6                                                                     ART05500 ARTS0550
      MPP1=MP-1                                                                      ART05510 ARTS0551
      MPP2=MP-2                                                                      ART05520 ARTS0552
      MPP3=MP-3                                                                      ART05530 ARTS0553
      MPP4=MP-4                                                                      ART05540 ARTS0554
      MPP5=MP-5                                                                      ART05550 ARTS0555
      IF(MP.GT.48) GO TO 6105                                                        ART05560 ARTS0556
      IF(IFLT(I,J).EQ.MSTO(N1518)) GO TO 4030                                        ART05570 ARTS0557
      IF(IFLT(I,J2).GT.MSTO(MP)) GO TO 4043                                          ART05580 ARTS0558
      GO TO 4030                                                                     ART05590 ARTS0559
6105  MP=MP-48                                                                       ART05600 ARTS0560
      IF(MPP1.GT.48) MPP1=MPP1-48                                                    ART05610 ARTS0561
      IF(MPP2.GT.48) MPP2=MPP2-48                                                    ART05620 ARTS0562
      IF(MPP3.GT.48) MPP3=MPP3-48                                                    ART05630 ARTS0563
      IF(MPP4.GT.48) MPP4=MPP4-48                                                    ART05640 ARTS0564
      IF(MPP5.GT.48) MPP5=MPP5-48                                                    ART05650 ARTS0565
      IF(IFLT(I,J).EQ.MSTO(N1518)) GO TO 4030                                        ART05660 ARTS0566
      IF(MSTO(N1518+6).EQ.2400) GO TO 3605                                           ART05670 ARTS0567
      IF(IFLT(I,J2).GT.MSTO(N1518+6)) GO TO 4043                                     ART05680 ARTS0568
      GO TO 4030                                                                     ART05690 ARTS0569
3605  IF(2400-IFLT(I,J2).GT.2370) GO TO 4043                                         ART05700 ARTS0570
      GO TO 4030                                                                     ART05710 ARTS0571
4043  NPO(I,J)=NPO(I,J)+LPO(I,N1518)+LPO(I,MPP5)+LPO(I,MPP4)                         ART05720 ARTS0572
      NPI(I,J)=NPI(I,J)+LPI(I,N1518)+LPI(I,MPP5)+LPI(I,MPP4)                         ART05730 ARTS0573
      NPO(I,J2)=NPO(I,J2)+LPO(I,MP)+LPO(I,MPP1)+LPO(I,MPP2)                          ART05740 ARTS0574
      NPI(I,J2)=NPI(I,J2)+LPI(I,MP)+LPI(I,MPP1)+LPI(I,MPP2)                          ART05750 ARTS0575
      LPO(I,N1518)=0                                                                 ART05760 ARTS0576
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      LPI(I,N1518)=0                                                    ART05770 ARTS0577
      LPO(I,MP)=0                                                       ART05780 ARTS0578
      LPI(I,MP)=0                                                       ART05790 ARTS0579
      LPO(I,MPP1)=0                                                     ART05800 ARTS0580
      LPI(I,MPP1)=0                                                     ART05810 ARTS0581
      LPO(I,MPP2)=0                                                     ART05820 ARTS0582
      LPI(I,MPP2)=0                                                     ART05830 ARTS0583
      LPO(I,MPP4)=0                                                     ART05840 ARTS0584
      LPI(I,MPP4)=0                                                     ART05850 ARTS0585
      LPO(I,MPP5)=0                                                     ART05860 ARTS0586
      LPI(I,MPP5)=0                                                     ART05870 ARTS0587
      IDNYP=LPO(I,MPP3)                                                 ART05880 ARTS0588
      IDNYT=MSTO(MPP3)                                                  ART05890 ARTS0589
      WRITE(6,4058) IDNYT,IDNYP                                         ART05900 ARTS0590
 4058 FORMAT(1X,'THERE ARE SOME DENIED PAX IN THE PERIOD OF',1X,        ART05910 ARTS0591
     1I4,2X,'WITH NUMBER OF PAX=',I4)                                   ART05920 ARTS0592
      GO TO 3999                                                        ART05930 ARTS0593
 4030 NPO(I,J)=NPO(I,J)+LPO(I,N1518)+LPO(I,MPP5)+LPO(I,MPP4)            ART05940 ARTS0594
      NPI(I,J)=NPI(I,J)+LPI(I,N1518)+LPI(I,MPP5)+LPI(I,MPP4)            ART05950 ARTS0595
      NPO(I,J2)=NPO(I,J2)+LPO(I,MPP1)+LPO(I,MPP2)+LPO(I,MPP3)           ART05960 ARTS0596
      NPI(I,J2)=NPI(I,J2)+LPI(I,MPP1)+LPI(I,MPP2)+LPI(I,MPP3)           ART05970 ARTS0597
      LPO(I,N1518)=0                                                    ART05980 ARTS0598
      LPI(I,N1518)=0                                                    ART05990 ARTS0599
      LPO(I,MPP1)=0                                                     ART06000 ARTS0600
      LPI(I,MPP1)=0                                                     ART06010 ARTS0601
      LPO(I,MPP2)=0                                                     ART06020 ARTS0602
      LPI(I,MPP2)=0                                                     ART06030 ARTS0603
      LPO(I,MPP3)=0                                                     ART06040 ARTS0604
      LPI(I,MPP3)=0                                                     ART06050 ARTS0605
      LPO(I,MPP4)=0                                                     ART06060 ARTS0606
      LPI(I,MPP4)=0                                                     ART06070 ARTS0607
      LPO(I,MPP5)=0                                                     ART06080 ARTS0608
      LPI(I,MPP5)=0                                                     ART06090 ARTS0609
      GO TO 3999                                                        ART06100 ARTS0610
 4027 CONTINUE                                                          ART06110 ARTS0611
 1820 CONTINUE                                                          ART06120 ARTS0612
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3999  IF(LOCAT.NE.NDATA) GO TO 3858                                    ART06130 ARTS0613
      WRITE(6,3200) IFLT(I,J),IFLT(I,J2),IDT,NPO(I,J),NPI(I,J),        ART06140 ARTS0614
     1NPO(I,J2),NPI(I,J2)                                              ART06150 ARTS0615
3200  FORMAT(38X,I4,1X,I4,3X,I4,3X,I4,1X,I4,1X,I4,1X,I4)               ART06160 ARTS0616
3858  CONTINUE                                                         ART06170 ARTS0617
1818  CONTINUE                                                         ART06180 ARTS0618
      IF(IBOND.EQ.2) GO TO 1842                                        ART06190 ARTS0619
      DO 1848 I=1,11                                                   ART06200 ARTS0620
      DO 1848 J=1,KB                                                   ART06210 ARTS0621
      NPOW(I,J)=NPO(I,J)                                               ART06220 ARTS0622
      NPIW(I,J)=NPI(I,J)                                               ART06230 ARTS0623
1848  CONTINUE                                                         ART06240 ARTS0624
      IBOND=2                                                          ART06250 ARTS0625
      DO 1833 L=1,11                                                   ART06260 ARTS0626
      DO 1833 N=1,KB                                                   ART06270 ARTS0627
      IFLT(L,N)=IFLTE(N,L)                                             ART06280 ARTS0628
1833  CONTINUE                                                         ART06290 ARTS0629
      DO 6001 M=1,11                                                   ART06300 ARTS0630
      DO 6001 N=1,48                                                   ART06310 ARTS0631
      LPO(M,N)=0                                                       ART06320 ARTS0632
      LPI(M,N)=0                                                       ART06330 ARTS0633
6001  CONTINUE                                                         ART06340 ARTS0634
      DO 1834 M=1,11                                                   ART06350 ARTS0635
      DO 1834 N=1,48                                                   ART06360 ARTS0636
      LPI(M,N)=LPIE(M,N)                                               ART06370 ARTS0637
      LPO(M,N)=LPOE(M,N)                                               ART06380 ARTS0638
1834  CONTINUE                                                         ART06390 ARTS0639
      GO TO 1835                                                       ART06400 ARTS0640
1842  DO 1973 I=1,11                                                   ART06410 ARTS0641
      DO 1973 J=1,KB                                                   ART06420 ARTS0642
      NPOE(I,J)=NPO(I,J)                                               ART06430 ARTS0643
      NPIE(I,J)=NPI(I,J)                                               ART06440 ARTS0644
1973  CONTINUE                                                         ART06450 ARTS0645
      WRITE(6,5000)                                                    ART06460 ARTS0646
5000  FORMAT(1X,'WOULD YOU LIKE TO LOAD SOME EXTRA PASSENGERS',        ART06470 ARTS0647
     1' BETWEEN ANY CITY PAIR? YES OR NO')                             ART06480 ARTS0648
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      READ(5,5001) LEXTRA                                                ART06490 ARTS0649
5001  FORMAT(A4)                                                         ART06500 ARTS0650
      IF(LEXTRA.NE.NLFTB) GO TO 5002                                     ART06510 ARTS0651
5016  WRITE(6,5003)                                                      ART06520 ARTS0652
5003  FORMAT(1X,'ENTER THE ORIGIN & DESTINATION AIRPORT CODE, AND',      ART06530 ARTS0653
     1' DIRECTION OF WESTBOUND OR EASTBOUND, THEN ENTER THE NUMBER',     ART06540 ARTS0654
     8' OF',/,                                                           ART06550 ARTS0655
     2' PASSENGERS DEPARTURE FROM THE ORIGIN AND THE LOCAL ',            ART06560 ARTS0656
     3'DEPARTURE TIME IN THE FOLLOWING FORMAT: XXX XXX B 0000 0000')     ART06570 ARTS0657
      READ(5,5004) IXO,IXD,IBD,IPA,LOC                                   ART06580 ARTS0658
5004  FORMAT(A3,1X,A3,1X,A1,1X,I4,1X,I4)                                 ART06590 ARTS0659
      DO 5005 L=1,11                                                     ART06600 ARTS0660
      IF(IXO.NE.LSMB(L)) GO TO 5005                                      ART06610 ARTS0661
      LY=L                                                               ART06620 ARTS0662
5005  CONTINUE                                                           ART06630 ARTS0663
      DO 5007 L=1,11                                                     ART06640 ARTS0664
      IF(IXD.NE.LSMB(L)) GO TO 5007                                      ART06650 ARTS0665
      LZ=L                                                               ART06660 ARTS0666
5007  CONTINUE                                                           ART06670 ARTS0667
      DATA IBB/'W'/                                                      ART06680 ARTS0668
      IF(IBD.NE.IBB) GO TO 5006                                          ART06690 ARTS0669
      DO 5008 JX=1,KB                                                    ART06700 ARTS0670
      IF(LOC.NE.IFLTLW(JX,LY)) GO TO 5008                                ART06710 ARTS0671
      MX=JX                                                              ART06720 ARTS0672
      GO TO 5009                                                         ART06730 ARTS0673
5008  CONTINUE                                                           ART06740 ARTS0674
5009  NPOW(LY,MX)=NPOW(LY,MX)+IPA                                        ART06750 ARTS0675
      NPIW(LZ,MX)=NPIW(LZ,MX)+IPA                                        ART06760 ARTS0676
      GO TO 5012                                                         ART06770 ARTS0677
5006  DO 5010 JY=1,KB                                                    ART06780 ARTS0678
      IF(LOC.NE.IFLTLE(JY,LY)) GO TO 5010                                ART06790 ARTS0679
      MY=JY                                                              ART06800 ARTS0680
      GO TO 5011                                                         ART06810 ARTS0681
5010  CONTINUE                                                           ART06820 ARTS0682
5011  NPOE(LY,MY)=NPOE(LY,MY)+IPA                                        ART06830 ARTS0683
      NPIE(LZ,MY)=NPIE(LZ,MY)+IPA                                        ART06840 ARTS0684
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5012  WRITE(6,5013)                                                          ART06850 ARTS0685
5013  FORMAT(1X,'DO YOU WANT TO ADD SOME MORE PASSENGERS ON ANY OTHER',      ART06860 ARTS0686
     1' CITY PAIR? YES OR NO')                                               ART06870 ARTS0687
      READ(5,5014) MORE                                                      ART06880 ARTS0688
5014  FORMAT(A4)                                                             ART06890 ARTS0689
      IF(MORE.NE.NLFTB) GO TO 5015                                           ART06900 ARTS0690
      LY=0                                                                   ART06910 ARTS0691
      LZ=0                                                                   ART06920 ARTS0692
      MX=0                                                                   ART06930 ARTS0693
      MY=0                                                                   ART06940 ARTS0694
      GO TO 5016                                                             ART06950 ARTS0695
5015  WRITE(6,5017)                                                          ART06960 ARTS0696
5017  FORMAT(1X,'PLEASE WAIT AND CHECK ON THE TABLE OF TRAFFIC LOADS')       ART06970 ARTS0697
5002  DO 1840 I=1,11                                                         ART06980 ARTS0698
      DO 1840 J=1,KB                                                         ART06990 ARTS0699
      IF(I.EQ.1) GO TO 1836                                                  ART07000 ARTS0700
      IF(I.EQ.11) GO TO 1837                                                 ART07010 ARTS0701
      NPFOW(I,J)=NPOBW(I-1,J)-NPIW(I,J)                                      ART07020 ARTS0702
      IF(NPFOW(I,J).LT.0) NPFOW(I,J)=0                                       ART07030 ARTS0703
      IF(NPFOW(I,J).EQ.0) NPIW(I,J)=NPOBW(I-1,J)                             ART07040 ARTS0704
      NPOBW(I,J)=NPFOW(I,J)+NPOW(I,J)                                        ART07050 ARTS0705
      GO TO 1840                                                             ART07060 ARTS0706
1836  NPOBW(1,J)=NPOW(1,J)                                                   ART07070 ARTS0707
      NPIW(1,J)=0                                                            ART07080 ARTS0708
      NPFOW(1,J)=0                                                           ART07090 ARTS0709
      GO TO 1840                                                             ART07100 ARTS0710
1837  NPIW(11,J)=NPOBW(10,J)                                                 ART07110 ARTS0711
      NPFOW(11,J)=0                                                          ART07120 ARTS0712
      NPOW(11,J)=0                                                           ART07130 ARTS0713
1840  CONTINUE                                                               ART07140 ARTS0714
      WRITE(6,5300)                                                          ART07150 ARTS0715
5300  FORMAT(1X,'DO YOU WANT THE COMBINED SCHEDULE FOR BOTH DIRECTION?',     ART07160 ARTS0716
     1' YES OR NO')                                                          ART07170 ARTS0717
      READ(5,5301) ICOM                                                      ART07180 ARTS0718
5301  FORMAT(A4)                                                             ART07190 ARTS0719
      IF(ICOM.NE.NLFTB) GO TO 5302                                           ART07200 ARTS0720
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      WRITE(6,954)                                                          ART07210 ARTS0721
      WRITE(6,955)                                                          ART07220 ARTS0722
      DO 145 I=1,KB                                                         ART07230 ARTS0723
      WRITE(6,204) IFLTW(I,11),IFLTLW(I,11),IFLTW(I,10),IFLTLW(I,10),       ART07240 ARTS0724
     1IFLTW(I,9),IFLTLW(I,9),IFLTW(I,8),IFLTLW(I,8),                        ART07250 ARTS0725
     2IFLTW(I,7),IFLTLW(I,7),IFLTW(I,6),IFLTLW(I,6),                        ART07260 ARTS0726
     3IFLTW(I,5),IFLTLW(I,5),IFLTW(I,4),IFLTLW(I,4),                        ART07270 ARTS0727
     4IFLTW(I,3),IFLTLW(I,3),IFLTW(I,2),IFLTLW(I,2),                        ART07280 ARTS0728
     5IFLTW(I,1),IFLTLW(I,1)                                                ART07290 ARTS0729
145   CONTINUE                                                              ART07300 ARTS0730
      WRITE(6,956)                                                          ART07310 ARTS0731
      WRITE(6,955)                                                          ART07320 ARTS0732
      DO 165 I=1,KB                                                         ART07330 ARTS0733
      WRITE(6,204) IFLTE(I,11),IFLTLE(I,11),IFLTE(I,10),IFLTLE(I,10),       ART07340 ARTS0734
     1IFLTE(I,9),IFLTLE(I,9),IFLTE(I,8),IFLTLE(I,8),IFLTE(I,7),             ART07350 ARTS0735
     2IFLTLE(I,7),IFLTE(I,6),IFLTLE(I,6),IFLTE(I,5),IFLTLE(I,5),            ART07360 ARTS0736
     3IFLTE(I,4),IFLTLE(I,4),IFLTE(I,3),IFLTLE(I,3),IFLTE(I,2),             ART07370 ARTS0737
     4IFLTLE(I,2),IFLTE(I,1),IFLTLE(I,1)                                    ART07380 ARTS0738
165   CONTINUE                                                              ART07390 ARTS0739
5302  DO 1841 ICK=1,11                                                      ART07400 ARTS0740
      DO 1841 J=1,KB                                                        ART07410 ARTS0741
      I=12-ICK                                                              ART07420 ARTS0742
      IF(I.EQ.11) GO TO 1889                                                ART07430 ARTS0743
      IF(I.EQ.10) GO TO 1841                                                ART07440 ARTS0744
      IF(I.EQ.1) GO TO 1888                                                 ART07450 ARTS0745
      NPFOE(I,J)=NPOBE(I,J)-NPIE(I,J)                                       ART07460 ARTS0746
      IF(NPFOE(I,J).LT.0) NPFOE(I,J)=0                                      ART07470 ARTS0747
      IF(NPFOE(I,J).EQ.0) NPIE(I,J)=NPOBE(I,J)                              ART07480 ARTS0748
      NPOBE(I-1,J)=NPFOE(I,J)+NPOE(I,J)                                     ART07490 ARTS0749
      GO TO 1841                                                            ART07500 ARTS0750
1889  NPFOE(11,J)=0                                                         ART07510 ARTS0751
      NPFOE(10,J)=0                                                         ART07520 ARTS0752
      NPOBE(10,J)=0                                                         ART07530 ARTS0753
      NPOBE(9,J)=NPOE(11,J)                                                 ART07540 ARTS0754
      NPIE(11,J)=0                                                          ART07550 ARTS0755
      GO TO 1841                                                            ART07560 ARTS0756
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1888  NPFOE(1,J)=0                                                          ART07570 ARTS0757
      NPOE(1,J)=0                                                           ART07580 ARTS0758
      NPIE(1,J)=NPOBE(1,J)                                                  ART07590 ARTS0759
1841  CONTINUE                                                              ART07600 ARTS0760
      WRITE(6,2064)                                                         ART07610 ARTS0761
2064  FORMAT(1X,'WOULD YOU LIKE TO  HAVE TRAFFIC LOADS? YES OR NO')         ART07620 ARTS0762
      READ(5,2065) LOADS                                                    ART07630 ARTS0763
2065  FORMAT(A4)                                                            ART07640 ARTS0764
      DATA NLOADS/'YES '/                                                   ART07650 ARTS0765
      IF(LOADS.EQ.NLOADS) GO TO 2103                                        ART07660 ARTS0766
      GO TO 2096                                                            ART07670 ARTS0767
2103  WRITE(6,2066)                                                         ART07680 ARTS0768
2066  FORMAT(1X,'THE TABULATION OF WESTBOUND FLIGHT IS ARRANGED BY THREE    ART07690 ARTS0769
     1 NUMBERS UNDER',                                                      ART07700 ARTS0770
     1' THE TITLE OF EACH HUB.',/,1X,'THE THREE NUMBERS ARE: OUTBOUND '     ART07710 ARTS0771
     2,'PASSENGER     INBOUND PASSENGER',/,35X,'FLY OVER PASSENGER')        ART07720 ARTS0772
      WRITE(6,2004)                                                         ART07730 ARTS0773
2004  FORMAT('1',40X,'WESTBOUND TRAFFIC LOAD OVER HUBS',/,                  ART07740 ARTS0774
     15X,'LAX',7X,'SFO',7X,'DEN',7X,'CHI',7X,'DET',7X,'CLE',7X,             ART07750 ARTS0775
     2'PIT',7X,'WAS',7X,'PHI',7X,'NYC',7X,'BOS',/)                          ART07760 ARTS0776
      DO 2001 J=1,KB                                                        ART07770 ARTS0777
      WRITE(6,2000) NPOW(11,J),NPIW(11,J),NPOW(10,J),NPIW(10,J),NPOW(9,J    ART07780 ARTS0778
     1),NPIW(9,J),NPOW(8,J),NPIW(8,J),NPOW(7,J),NPIW(7,J),NPOW(6,J),        ART07790 ARTS0779
     2NPIW(6,J),NPOW(5,J),NPIW(5,J),NPOW(4,J),NPIW(4,J),NPOW(3,J),          ART07800 ARTS0780
     3NPIW(3,J),NPOW(2,J),NPIW(2,J),NPOW(1,J),NPIW(1,J),NPFOW(11,J),        ART07810 ARTS0781
     4NPFOW(10,J),NPFOW(9,J),NPFOW(8,J),NPFOW(7,J),NPFOW(6,J),NPFOW(5,J)    ART07820 ARTS0782
     5,NPFOW(4,J),NPFOW(3,J),NPFOW(2,J),NPFOW(1,J)                          ART07830 ARTS0783
2000  FORMAT(11(1X,I4,1X,I4),/,4X,11(I4,6X),//)                             ART07840 ARTS0784
2001  CONTINUE                                                              ART07850 ARTS0785
      WRITE(6,8800)                                                         ART07860 ARTS0786
8800  FORMAT(1X,'THE LIST IS TABULATED AS FOLLOWING:',                      ART07870 ARTS0787
     1/,35X,'OUTBOUND PASSENGER   INBOUND PASSENGER',/,46X,                 ART07880 ARTS0788
     2'FLY OVER PASSENGER',/)                                               ART07890 ARTS0789
      WRITE(6,2014)                                                         ART07900 ARTS0790
2014  FORMAT('1',40X,'EASTBOUND TRAFFIC LOAD OVER HUBS',/,                  ART07910 ARTS0791
     15X,'LAX',7X,'SFO',7X,'DEN',7X,'CHI',7X,'DET',7X,'CLE',7X,             ART07920 ARTS0792
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     .2'PIT',7X,'WAS',7X,'PHI',7X,'NYC',7X,'BOS')                                    ART07930 ARTS0793
      DO 2011 J=1,KB                                                                 ART07940 ARTS0794
      WRITE(6,2000) NPOE(11,J),NPIE(11,J),NPOE(10,J),NPIE(10,J),NPOE(9,JART07950 ARTS0795
     1),NPIE(9,J),NPOE(8,J),NPIE(8,J),NPOE(7,J),NPIE(7,J),NPOE(6,J),    ART07960 ARTS0796
     2NPIE(6,J),NPOE(5,J),NPIE(5,J),NPOE(4,J),NPIE(4,J),NPOE(3,J),      ART07970 ARTS0797
     3NPIE(3,J),NPOE(2,J),NPIE(2,J),NPOE(1,J),NPIE(1,J),NPFOE(11,J),    ART07980 ARTS0798
     4NPFOE(10,J),NPFOE(9,J),NPFOE(8,J),NPFOE(7,J),NPFOE(6,J),NPFOE(5,J)ART07990 ARTS0799
     5,NPFOE(4,J),NPFOE(3,J),NPFOE(2,J),NPFOE(1,J)                       ART08000 ARTS0800
2011  CONTINUE                                                                       ART08010 ARTS0801
C     DETERMINATION OF OVERALL LOAD FACTOR BY REVENUE PASSENGER MILE &  ART08020 ARTS0802
C     AVAILABLE SEAT MILES                                                           ART08030 ARTS0803
C                                                                                    ART08040 ARTS0804
2096  IRPM=0                                                                         ART08050 ARTS0805
      DATA OVER /'****'/                                                             ART08060 ARTS0806
      IASM=0                                                                         ART08070 ARTS0807
      DO 1850 J=1,KB                                                                 ART08080 ARTS0808
      DO 1850 I=1,10                                                                 ART08090 ARTS0809
      IRPM=NPOBW(I,J)*MLW(I)+IRPM                                                    ART08100 ARTS0810
      IASM=ISEAT*MLW(I)+IASM                                                         ART08110 ARTS0811
      LFW(I,J)=FLOAT(NPOBW(I,J))/FLOAT(ISEAT)                                        ART08120 ARTS0812
      FW(I,J)=LFW(I,J)                                                               ART08130 ARTS0813
      IF(LFW(I,J).GT.CR) LFW(I,J)=OVER                                               ART08140 ARTS0814
1850  CONTINUE                                                                       ART08150 ARTS0815
      DO 1851 J=1,KB                                                                 ART08160 ARTS0816
      DO 1851 I=1,9                                                                  ART08170 ARTS0817
      IRPM=NPOBE(I,J)*MLE(I)+IRPM                                                    ART08180 ARTS0818
      IASM=ISEAT*MLE(I)+IASM                                                         ART08190 ARTS0819
      LFE(I,J)=FLOAT(NPOBE(I,J))/FLOAT(ISEAT)                                        ART08200 ARTS0820
      FE(I,J)=LFE(I,J)                                                               ART08210 ARTS0821
      IF(LFE(I,J).GT.CR) LFE(I,J)=OVER                                               ART08220 ARTS0822
1851  CONTINUE                                                                       ART08230 ARTS0823
      WRITE(6,5303)                                                                  ART08240 ARTS0824
5303  FORMAT(1X,'DO YOU WANT THE SEGMENT LOAD FACTOR? YES OR NO')                    ART08250 ARTS0825
      READ(5,5304) ISEG                                                              ART08260 ARTS0826
5304  FORMAT(A4)                                                                     ART08270 ARTS0827
      IF(ISEG.NE.NLFTB) GO TO 2067                                                   ART08280 ARTS0828
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      WRITE(6,2005)                                                    ART08290 ARTS0829
2005  FORMAT(' ',1X,'THE FOLLOWING OUTPUT IS TABULATED AS:',/,30X,     ART08300 ARTS0830
     1'ONBOARD PAX      LOAD FACTOR',/,34X,'LOCAL DEPARTURE TIME',//,  ART08310 ARTS0831
     240X,'WESTBOUND SEGMENT LOAD')                                    ART08320 ARTS0832
      WRITE(6,2007)                                                    ART08330 ARTS0833
2007  FORMAT(2X,'SFO-LAX',4X,'DEN-SFO',4X,'CHI-DEN',4X,'DET-CHI',      ART08340 ARTS0834
     14X,'CLE-DET',4X,'PIT-CLE',4X,'WAS-PIT',4X,'PHI-WAS',4X,'NYC-',   ART08350 ARTS0835
     2'PHI',4X,'BOS-NYC')                                              ART08360 ARTS0836
      DO 2050 J=1,KB                                                   ART08370 ARTS0837
      WRITE(6,2006) NPOBW(10,J),LFW(10,J),NPOBW(9,J),LFW(9,J),NPOBW(8,J) ART08380 ARTS0838
     1,LFW(8,J),NPOBW(7,J),LFW(7,J),NPOBW(6,J),LFW(6,J),NPOBW(5,J),    ART08390 ARTS0839
     2LFW(5,J),NPOBW(4,J),LFW(4,J),NPOBW(3,J),LFW(3,J),NPOBW(2,J),     ART08400 ARTS0840
     3LFW(2,J),NPOBW(1,J),LFW(1,J),IFLTLW(J,10),IFLTLW(J,9),IFLTLW     ART08410 ARTS0841
     4(J,8),IFLTLW(J,7),IFLTLW(J,6),IFLTLW(J,5),IFLTLW(J,4),IFLTLW     ART08420 ARTS0842
     5(J,3),IFLTLW(J,2),IFLTLW(J,1)                                    ART08430 ARTS0843
2006  FORMAT(1X,10(I4,1X,F4.2,2X),/,4X,10(I4,7X),//)                   ART08440 ARTS0844
2050  CONTINUE                                                         ART08450 ARTS0845
      WRITE(6,2015)                                                    ART08460 ARTS0846
2015  FORMAT(' ',40X,'EASTBOUND SEGMENT LOAD')                         ART08470 ARTS0847
      WRITE(6,2017)                                                    ART08480 ARTS0848
2017  FORMAT(2X,'LAX-DEN',5X,'DEN-CHI',5X,'CHI-DET',5X,'DET-CLE',      ART08490 ARTS0849
     15X,'CLE-PIT',5X,'PIT-WAS',5X,'WAS-PHI',5X,'PHI-NYC',5X,          ART08500 ARTS0850
     2'NYC-BOS')                                                       ART08510 ARTS0851
      DO 2051 J=1,KB                                                   ART08520 ARTS0852
      WRITE(6,2016) NPOBE(9,J),LFE(9,J),NPOBE(8,J),LFE(8,J),NPOBE(7,J), ART08530 ARTS0853
     1LFE(7,J),NPOBE(6,J),LFE(6,J),NPOBE(5,J),LFE(5,J)                 ART08540 ARTS0854
     2,NPOBE(4,J),LFE(4,J),NPOBE(3,J),LFE(3,J),NPOBE(2,J),             ART08550 ARTS0855
     3LFE(2,J),NPOBE(1,J),LFE(1,J),IFLTLE(J,11),IFLTLE(J,9),IFLTLE     ART08560 ARTS0856
     4(J,8),IFLTLE(J,7),IFLTLE(J,6),IFLTLE(J,5),IFLTLE(J,4),IFLTLE     ART08570 ARTS0857
     5(J,3),IFLTLE(J,2)                                                ART08580 ARTS0858
2016  FORMAT(1X,9(I4,1X,F4.2,3X),/,4X,9(I4,8X),//)                     ART08590 ARTS0859
2051  CONTINUE                                                         ART08600 ARTS0860
      OVRLLF=FLOAT(IRPM)/FLOAT(IASM)                                   ART08610 ARTS0861
      PRINT997,OVRLLF                                                  ART08620 ARTS0862
997   FORMAT('1',7X,'*** OVERALL LOAD FACTOR = ',F5.2)                 ART08630 ARTS0863
C                                                                      ART08640 ARTS0864
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C     OUTPUT OF OVER LOAD SEGMENT                                          ART08650 ARTS0865
C                                                                          ART08660 ARTS0866
2067  WRITE(6,2068)                                                        ART08670 ARTS0867
2068  FORMAT(1X,'WANT TO HAVE THE DAILY SCHEDULING MAP OVER STATION?',     ART08680 ARTS0868
     1'YES OR NO?')                                                       ART08690 ARTS0869
      READ(5,2069) MAP                                                    ART08700 ARTS0870
2069  FORMAT(A4)                                                           ART08710 ARTS0871
      DATA NOMAP /'YES '/                                                 ART08720 ARTS0872
      IF(MAP.EQ.NOMAP) GO TO 2104                                         ART08730 ARTS0873
      GO TO 2070                                                          ART08740 ARTS0874
C     SORTING SUBPROGRAM FOR THE DAILY SCHEDULE OF EACH FLIGHT             ART08750 ARTS0875
2104  KJ=K*2                                                              ART08760 ARTS0876
      KM1=KJ-1                                                            ART08770 ARTS0877
      DO 81 ID=1,11                                                       ART08780 ARTS0878
      DO 82 I=1,KM1                                                       ART08790 ARTS0879
      IP1=I+1                                                             ART08800 ARTS0880
      DO 83 J=IP1,KJ                                                      ART08810 ARTS0881
      IF(IFLTE(I,ID).LE.IFLTE(J,ID)) GO TO 83                             ART08820 ARTS0882
      ITEMP=IFLTE(I,ID)                                                   ART08830 ARTS0883
      IFLTE(I,ID)=IFLTE(J,ID)                                             ART08840 ARTS0884
      IFLTE(J,ID)=ITEMP                                                   ART08850 ARTS0885
      ITEMP=IFLTLE(I,ID)                                                  ART08860 ARTS0886
      IFLTLE(I,ID)=IFLTLE(J,ID)                                           ART08870 ARTS0887
      IFLTLE(J,ID)=ITEMP                                                  ART08880 ARTS0888
83    CONTINUE                                                            ART08890 ARTS0889
82    CONTINUE                                                            ART08900 ARTS0890
      DO 84 M=1,KM1                                                       ART08910 ARTS0891
      IP1=M+1                                                             ART08920 ARTS0892
      DO 85 N=IP1,KJ                                                      ART08930 ARTS0893
      IF(IFLTW(M,ID).LE.IFLTW(N,ID)) GO TO 85                             ART08940 ARTS0894
      ITEMP=IFLTW(M,ID)                                                   ART08950 ARTS0895
      IFLTW(M,ID)=IFLTW(N,ID)                                             ART08960 ARTS0896
      IFLTW(N,ID)=ITEMP                                                   ART08970 ARTS0897
      ITEMP=IFLTLW(M,ID)                                                  ART08980 ARTS0898
      IFLTLW(M,ID)=IFLTLW(N,ID)                                           ART08990 ARTS0899
      IFLTLW(N,ID)=ITEMP                                                  ART09000 ARTS0900
```

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85    CONTINUE                                                          ART09010 ARTS0901
84    CONTINUE                                                          ART09020 ARTS0902
81    CONTINUE                                                          ART09030 ARTS0903
      WRITE(6,954)                                                      ART09040 ARTS0904
954   FORMAT('1',36X,'SCHEDULE OF WESTBOUND FLIGHT AT EACH HUB')        ART09050 ARTS0905
      WRITE(6,955)                                                      ART09060 ARTS0906
      DO 154 I=1,KB                                                     ART09070 ARTS0907
      WRITE(6,204) IFLTW(I,11),IFLTLW(I,11),IFLTW(I,10),IFLTLW(I,10),   ART09080 ARTS0908
     1IFLTW(I,9),IFLTLW(I,9),IFLTW(I,8),IFLTLW(I,8),                    ART09090 ARTS0909
     2IFLTW(I,7),IFLTLW(I,7),IFLTW(I,6),IFLTLW(I,6),                    ART09100 ARTS0910
     3IFLTW(I,5),IFLTLW(I,5),IFLTW(I,4),IFLTLW(I,4),                    ART09110 ARTS0911
     4IFLTW(I,3),IFLTLW(I,3),IFLTW(I,2),IFLTLW(I,2),                    ART09120 ARTS0912
     5IFLTW(I,1),IFLTLW(I,1)                                            ART09130 ARTS0913
154   CONTINUE                                                          ART09140 ARTS0914
      WRITE(6,956)                                                      ART09150 ARTS0915
956   FORMAT('1',36X,'SCHEDULE OF EASTBOUND FLIGHT AT EACH HUB')        ART09160 ARTS0916
      WRITE(6,955)                                                      ART09170 ARTS0917
      DO 156 I=1,KB                                                     ART09180 ARTS0918
      WRITE(6,204) IFLTE(I,11),IFLTLE(I,11),IFLTE(I,10),IFLTLE(I,10),   ART09190 ARTS0919
     1IFLTE(I,9),IFLTLE(I,9),IFLTE(I,8),IFLTLE(I,8),IFLTE(I,7),         ART09200 ARTS0920
     2IFLTLE(I,7),IFLTE(I,6),IFLTLE(I,6),IFLTE(I,5),IFLTLE(I,5),        ART09210 ARTS0921
     3IFLTE(I,4),IFLTLE(I,4),IFLTE(I,3),IFLTLE(I,3),IFLTE(I,2),         ART09220 ARTS0922
     4IFLTLE(I,2),IFLTE(I,1),IFLTLE(I,1)                                ART09230 ARTS0923
156   CONTINUE                                                          ART09240 ARTS0924
      PRINT1103                                                         ART09250 ARTS0925
1103  FORMAT(' ',35X,'FIRST DEPARTURE OF EACH LINER FROM BOSTON')       ART09260 ARTS0926
      PRINT1108,(IDEPRT(N),N=1,NEND)                                    ART09270 ARTS0927
1108  FORMAT(50X,I4)                                                    ART09280 ARTS0928
2070  WRITE(6,7775)                                                     ART09290 ARTS0929
7775  FORMAT(1X,'DO YOU WANT THE LOAD FACTOR DISTRIBUTION? YES OR NO')  ART09300 ARTS0930
      READ(5,7776) LSW                                                  ART09310 ARTS0931
7776  FORMAT(A4)                                                        ART09320 ARTS0932
      IF(LSW.NE.NLFTB) GO TO 2077                                       ART09330 ARTS0933
      WRITE(6,7838)                                                     ART09340 ARTS0934
7838  FORMAT(1X,'PLEASE ENTER ONE CHARACTER OR SYMBOL WHICH YOU ',      ART09350 ARTS0935
     1'WOULD LIKE TO PLOT ON THE DISTRIBUTION GRAPH.',/,' AND PRECEDED',ART09360 ARTS0936
```

```
     1' IT BY A BLANK AND A PERIOD (.)')                                    ART09370 ARTS0937
      READ(5,7839) BLANK,BAR,DOT                                            ART09380 ARTS0938
7839  FORMAT(A1,A1,A1)                                                      ART09390 ARTS0939
      DO 7307 IX=1,111                                                      ART09400 ARTS0940
      DO 7307 IY=1,51                                                       ART09410 ARTS0941
7307  LAXIS(IX,IY)=BLANK                                                    ART09420 ARTS0942
      DO 7308 IX=1,111                                                      ART09430 ARTS0943
7308  LAXIS(IX,51)=DOT                                                      ART09440 ARTS0944
      DO 7309 IY=1,51                                                       ART09450 ARTS0945
7309  LAXIS(1,IY)=DOT                                                       ART09460 ARTS0946
      LEGTOT=19*KB                                                          ART09470 ARTS0947
      WRITE(6,7782) LEGTOT                                                  ART09480 ARTS0948
7782  FORMAT(30X,'LOAD FACTOR DISTRIBUTION',5X,'TOTAL LEG=',I3,/,           ART09490 ARTS0949
     133X,'L.F.',4X,'%LEG',4X,'#LEG')                                       ART09500 ARTS0950
      DLF=0.                                                                ART09510 ARTS0951
      NUM=0                                                                 ART09520 ARTS0952
      IX=1                                                                  ART09530 ARTS0953
      DO 7778 I=1,22                                                        ART09540 ARTS0954
      NUM=0                                                                 ART09550 ARTS0955
      DLF=DLF+0.05                                                          ART09560 ARTS0956
      PLF=DLF-0.05                                                          ART09570 ARTS0957
      DO 7779 J=1,10                                                        ART09580 ARTS0958
      DO 7779 K=1,KB                                                        ART09590 ARTS0959
      IF(FW(J,K).LT.PLF) GO TO 7779                                         ART09600 ARTS0960
      IF(FW(J,K).GE.DLF) GO TO 7779                                         ART09610 ARTS0961
      NUM=NUM+1                                                             ART09620 ARTS0962
7779  CONTINUE                                                              ART09630 ARTS0963
      DO 7780 L=1,9                                                         ART09640 ARTS0964
      DO 7780 M=1,KB                                                        ART09650 ARTS0965
      IF(FE(L,M).LT.PLF) GO TO 7780                                         ART09660 ARTS0966
      IF(FE(L,M).GE.DLF) GO TO 7780                                         ART09670 ARTS0967
      NUM=NUM+1                                                             ART09680 ARTS0968
7780  CONTINUE                                                              ART09690 ARTS0969
      PLEG=FLOAT(NUM)/FLOAT(LEGTOT)                                         ART09700 ARTS0970
      IX=IX+5                                                               ART09710 ARTS0971
      IY=IFIX(PLEG*100.*2.)                                                 ART09720 ARTS0972
```

```
      IG=50-IY                                                          ART09730 ARTS0973
      IF(IY.EQ.0)IG=51                                                  ART09740 ARTS0974
      LAXIS(IX,IG)=DOT                                                  ART09750 ARTS0975
      DO 6338 IB=IG,51                                                  ART09760 ARTS0976
 6338 LAXIS(IX,IB)=DOT                                                  ART09770 ARTS0977
      DO 6343 IC=IG,51                                                  ART09780 ARTS0978
 6343 LAXIS(IX-5,IC)=DOT                                                ART09790 ARTS0979
 6342 DO 7310 KCC=1,5                                                   ART09800 ARTS0980
 7310 LAXIS(IX-KCC,IG)=DOT                                              ART09810 ARTS0981
      WRITE(6,7781) PLF,DLF,PLEG,NUM                                    ART09820 ARTS0982
 7781 FORMAT(30X,F4.2,'-',F4.2,2X,F5.3,3X,I3)                           ART09830 ARTS0983
      NUM=0                                                             ART09840 ARTS0984
 7778 CONTINUE                                                          ART09850 ARTS0985
      LCC=0                                                             ART09860 ARTS0986
      DO 7301 J1=1,10                                                   ART09870 ARTS0987
      DO 7301 K1=1,KB                                                   ART09880 ARTS0988
      IF(FW(J1,K1).GE.CR) LCC=LCC+1                                     ART09890 ARTS0989
 7301 CONTINUE                                                          ART09900 ARTS0990
      DO 7302 J2=1,9                                                    ART09910 ARTS0991
      DO 7302 K2=1,KB                                                   ART09920 ARTS0992
      IF(FE(J2,K2).GE.CR) LCC=LCC+1                                     ART09930 ARTS0993
 7302 CONTINUE                                                          ART09940 ARTS0994
      IF(LCC.EQ.0) GO TO 7362                                           ART09950 ARTS0995
      WRITE(6,7303) LCC,CR                                              ART09960 ARTS0996
 7303 FORMAT(1X,'****ATTENTION: THERE ARE',I2,1X,'SEGMENTS OVER ',      ART09970 ARTS0997
     1'YOUR SPECIFIED CRITICAL LOAD FACTOR ',F4.2)                      ART09980 ARTS0998
 7362 WRITE(6,6339)                                                     ART09990 ARTS0999
 6339 FORMAT(////,39X,'HISTOGRAM OF LOAD FACTOR DISTRIBUTION',//)       ART10000 ARTS1000
      DO 7314 NY=1,51                                                   ART10010 ARTS1001
 7314 IVY(NY)=0.                                                        ART10020 ARTS1002
      IVY(1)=25.                                                        ART10030 ARTS1003
      NG=0.                                                             ART10040 ARTS1004
      DO 7322 NY=2,51                                                   ART10050 ARTS1005
      NG=NG+0.5                                                         ART10060 ARTS1006
 7322 IVY(NY)=IVY(1)-NG                                                 ART10070 ARTS1007
      DO 7365 NX=1,111                                                  ART10080 ARTS1008
```

```
7365  IVX(NX)=BLANK                                                    ART10090 ARTS1009
      IVX(1)=BAR                                                       ART10100 ARTS1010
      DO 7366 NX=6,111,5                                               ART10110 ARTS1011
7366  IVX(NX)=BAR                                                      ART10120 ARTS1012
      WRITE(6,7368)                                                    ART10130 ARTS1013
7368  FORMAT(1X,'% LEG (%)')                                           ART10140 ARTS1014
      DO 6344 IY=1,51                                                  ART10150 ARTS1015
      WRITE(6,7413) IVY(IY),(LAXIS(IX,IY),IX=1,111)                    ART10160 ARTS1016
7413  FORMAT(1X,F4.1,1X,111A1)                                         ART10170 ARTS1017
6344  CONTINUE                                                         ART10180 ARTS1018
      WRITE(6,7319) (IVX(NX),NX=1,111)                                 ART10190 ARTS1019
7319  FORMAT(6X,111A1)                                                 ART10200 ARTS1020
      IV(1)=0                                                          ART10210 ARTS1021
      NH=0                                                             ART10220 ARTS1022
      DO 7321 I=2,23                                                   ART10230 ARTS1023
      NH=NH+5                                                          ART10240 ARTS1024
7321  IV(I)=IV(1)+NH                                                   ART10250 ARTS1025
      WRITE(6,7320) (IV(I),I=1,23)                                     ART10260 ARTS1026
7320  FORMAT(6X,I1,4X,I1,3X,17(I2,3X),5(I3,2X))                        ART10270 ARTS1027
      WRITE(6,6357)                                                    ART10280 ARTS1028
6357  FORMAT(//,50X,'LOAD FACTOR (%)',////)                            ART10290 ARTS1029
2077  WRITE(6,2071)                                                    ART10300 ARTS1030
2071  FORMAT(1X,'LIKE TO TRY DIFFERENT NUMBER OF LINER AND SEAT',      ART10310 ARTS1031
     1' CAPACITY, OR CHANGING THE FIRST DEPARTURE SCHEDULE OF EACH',    ART10320 ARTS1032
     2' LINER?',/,1X,'YES OR NO')                                      ART10330 ARTS1033
      READ(5,2072) LSC                                                 ART10340 ARTS1034
2072  FORMAT(A4)                                                       ART10350 ARTS1035
      IF(LSC.NE.NLFTB) GO TO 2073                                      ART10360 ARTS1036
      GO TO 1107                                                       ART10370 ARTS1037
2073  WRITE(6,361)                                                     ART10380 ARTS1038
361   FORMAT(1X,'THANK YOU FOR PLAYING ARTS - GOOD DAY')               ART10390 ARTS1039
      STOP                                                             ART10400 ARTS1040
      END                                                              ART10410 ARTS1041
```

APPENDIX E

COMPUTER PRINTOUT OF TRANSCONTINENTAL CASE STUDY

```
 load arts
Y (19E) R/O
FILEDEF 8 DISK ARTS DATA ( RECFM F LRECL 80 BLOCK 3000 PERM
GLOBAL TXTLIB FORTLIB FORTMOD2
CP TERMINAL LINESIZE 132
CP TERMINAL LINEDEL ~
R; T=0.01/0.06 11:01:34

R; T=0.10/0.27 11:01:39

.start main
EXECUTION BEGINS...
PLEASE ENTER YOUR NAME PRECEDED BY A BLANK
. elliott liu
HELLO!  ELLIOTT LIU    WELCOME TO PLAY THE AERIAL RELAY TRANSPORTATION SYSTEM
ENTER THE NUMBER OF LINER FOR DAILY OPERATION, AND THE SEAT CAPACITY & CRITICAL LOAD FACTOR FOR EACH LINER
00 0000 0.00
.06 3200 0.90
TYPE IN 2 DIGIT IN HOUR  &  2 DIGIT IN MIN. OF---------THE DESIRED DEPARTURE SCHEDULES (GMT) FROM BOSTON
THEN TYPE--THE RETURN KEY AFTER EACH ENTRY. PLEASE NOTE! MORE THAN 3 HR.
SEPARATION BETWEEN ANY TWO ADJACENT FLIGHTS MIGHT CAUSE DENIED PASSENGERS
.0900
.1000
.1200
.1400
.1600
.1800
DO YOU WANT THE INITIAL DEMAND DATA? YES OR NO
.yes
```

WESTBOUND INITIAL DEMAND DATA

GMT	LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
TIME	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD
0	0	0	185	166	45	96	93	270	44	61	37	39	35	49	77	87	60	19	281	67	157	0
30	0	0	173	168	43	91	77	226	37	57	32	33	29	40	67	76	53	16	247	57	138	0
100	0	0	151	155	36	75	66	189	38	60	31	35	29	45	69	82	57	17	258	55	142	0
130	0	0	108	139	29	62	62	160	36	60	30	36	31	44	70	82	57	18	260	58	143	0
200	0	0	88	116	25	53	65	157	35	55	30	35	28	42	66	77	54	17	244	56	134	0
230	0	0	68	96	22	45	64	160	34	46	28	31	20	37	58	70	46	16	247	53	120	0
300	0	0	58	88	23	49	60	155	27	34	23	23	21	29	45	52	36	12	166	44	92	0
330	0	0	31	81	23	49	51	148	21	24	17	16	14	19	32	35	26	8	114	31	64	0
400	0	0	42	84	22	47	37	123	16	18	14	12	11	15	22	26	19	7	85	22	46	0
430	0	0	42	82	20	44	26	88	11	10	10	9	7	11	15	18	12	4	54	16	30	0
500	0	0	53	72	15	32	20	64	6	2	5	4	4	4	7	7	4	3	23	10	14	0
530	0	0	56	58	10	21	13	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	55	43	8	18	2	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630	0	0	45	31	5	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	40	16	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	0	0	46	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	5	0	1	0	2	3	5	4	1	14	0	7	0
930	0	0	0	0	0	0	0	0	1	9	2	4	2	5	10	9	5	1	30	4	17	0
1000	0	0	0	0	0	0	4	1	5	16	5	8	6	11	16	19	13	4	62	9	34	0
1030	0	0	0	0	0	0	9	10	10	28	9	13	9	16	28	30	22	6	100	16	57	0
1100	0	0	0	0	1	3	17	23	18	47	15	25	18	31	49	59	39	11	184	28	100	0
1130	0	0	0	0	2	7	28	41	27	71	24	37	28	46	75	87	60	17	276	48	151	0
1200	0	0	30	7	5	14	50	77	44	94	36	53	41	66	102	123	83	24	379	70	205	0
1230	0	0	38	13	8	25	75	126	59	105	50	68	54	83	123	153	100	32	465	96	252	0
1300	0	0	61	29	15	43	103	191	59	93	50	60	50	74	116	133	95	29	427	102	238	0
1330	0	0	81	43	23	61	117	260	57	83	48	52	45	63	100	115	81	25	372	88	207	0
1400	0	0	121	75	34	78	102	273	52	76	45	46	40	58	91	107	74	24	343	79	190	0
1430	0	0	154	108	44	91	89	246	47	73	39	44	37	55	88	99	69	21	310	73	176	0
1500	0	0	192	132	38	83	82	240	44	66	37	42	35	50	80	93	64	20	298	68	164	0
1530	0	0	229	147	33	73	77	202	41	62	35	39	34	49	75	87	60	18	279	64	153	0
1600	0	0	223	131	30	65	72	190	45	57	32	35	29	43	68	79	54	17	256	59	141	0
1630	0	0	214	115	28	59	68	178	40	56	29	32	28	38	65	73	51	16	235	53	133	0
1700	0	0	209	105	27	55	61	164	41	58	29	35	29	42	69	78	54	17	251	53	137	0
1730	0	0	205	100	25	53	59	148	36	61	30	36	30	45	70	84	57	18	266	56	147	0
1800	0	0	194	93	23	48	62	149	38	66	32	40	33	46	76	88	60	18	280	60	155	0
1830	0	0	191	86	20	44	69	156	39	68	35	40	34	49	80	92	64	19	289	63	161	0
1900	0	0	172	81	22	47	71	166	41	69	35	38	34	50	82	94	66	20	305	65	168	0
1930	0	0	154	78	23	50	73	174	43	79	36	41	35	53	89	100	72	21	327	67	182	0
2000	0	0	156	84	25	53	75	180	52	96	44	51	44	60	109	128	87	25	401	77	218	0
2030	0	0	157	89	26	53	84	186	60	113	50	61	54	83	130	153	104	32	478	97	262	0
2100	0	0	163	94	27	55	105	218	66	117	58	64	59	87	137	160	111	34	508	110	279	0
2130	0	0	167	97	28	57	122	264	74	118	62	66	61	90	140	165	113	35	522	114	286	0
2200	0	0	163	106	35	74	128	299	72	115	62	64	60	87	140	158	110	34	503	114	276	0
2230	0	0	163	119	43	84	130	318	70	102	59	60	56	81	126	149	103	33	469	110	257	0
2300	0	0	179	142	45	95	123	316	61	86	53	51	48	69	108	123	87	28	397	98	221	0
2330	0	0	179	162	47	100	114	306	52	70	45	41	40	54	88	100	69	23	325	80	181	0

EASTBOUND INITIAL DEMAND DATA

GMT	LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
TIME	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD	OUTB	INBD
0	199	319	0	0	78	39	207	75	59	26	38	26	47	25	88	51	19	48	68	204	0	138
30	181	324	0	0	72	35	187	61	55	24	34	23	40	21	77	45	16	42	58	176	0	122
100	158	309	0	0	64	34	177	51	58	24	35	23	44	21	82	45	17	43	56	185	0	120
130	123	283	0	0	50	30	157	38	57	23	35	23	44	19	83	40	18	40	59	173	0	121
200	64	236	0	0	43	27	157	17	53	18	34	19	41	17	78	35	17	37	58	163	0	120
230	43	193	0	0	35	24	140	14	45	14	30	16	37	16	71	38	16	36	54	162	0	109
300	36	167	0	0	29	21	113	12	34	14	22	14	28	13	52	31	12	29	45	130	0	88
330	28	144	0	0	16	18	94	9	24	11	16	11	19	8	36	25	8	22	32	99	0	62
400	13	153	0	0	12	15	67	6	18	10	12	9	14	6	26	19	7	16	23	78	0	49
430	11	151	0	0	9	13	38	0	10	5	8	5	11	5	18	18	4	13	17	67	0	38
500	12	149	0	0	6	8	8	0	2	5	4	4	4	4	8	14	3	10	10	49	0	22
530	29	123	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	35	89	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630	36	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	44	49	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
730	52	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	47	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
830	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	4	8	1	6	2	6	5	13	1	9	0	41	0	13
930	0	0	0	0	0	0	0	0	8	11	5	8	5	8	9	20	1	13	4	62	0	25
1000	0	0	0	0	0	0	22	20	15	20	8	12	9	14	20	33	4	23	9	107	0	45
1030	0	0	0	0	0	0	41	28	27	26	13	18	16	19	31	46	6	33	16	149	0	72
1100	0	0	0	0	15	5	78	42	46	41	22	29	30	31	59	72	11	55	28	245	0	112
1130	0	0	0	0	20	8	115	54	66	55	36	40	45	38	88	91	18	69	49	319	0	158
1200	44	10	0	0	31	15	184	73	91	62	52	48	65	47	125	112	24	90	71	406	0	212
1230	56	20	0	0	40	21	220	84	102	70	66	55	82	53	155	120	32	105	97	480	0	255
1300	82	43	0	0	54	29	246	96	90	64	57	52	72	49	135	118	30	95	104	444	0	250
1330	105	71	0	0	62	32	267	111	81	59	50	48	71	45	117	112	25	88	90	411	0	226
1400	152	125	0	0	72	37	241	105	74	58	47	46	58	45	109	110	24	87	80	399	0	207
1430	185	185	0	0	78	41	217	99	70	59	43	45	52	42	100	105	22	81	74	376	0	194
1500	221	253	0	0	74	37	202	95	65	56	41	43	50	39	95	101	20	78	69	358	0	184
1530	256	295	0	0	69	34	185	92	61	54	38	41	47	39	89	96	19	75	65	344	0	175
1600	245	256	0	0	67	31	173	90	55	52	35	38	43	37	80	90	18	69	60	317	0	162
1630	244	223	0	0	64	28	170	98	53	51	31	37	38	36	74	82	16	62	54	289	0	149
1700	255	209	0	0	63	28	166	100	56	51	34	38	41	36	80	84	17	65	54	296	0	152
1730	253	194	0	0	63	28	164	98	59	51	35	39	44	37	84	85	18	68	58	303	0	158
1800	246	182	0	0	64	27	173	104	63	50	38	38	46	39	89	87	19	69	61	313	0	170
1830	245	170	0	0	66	26	182	106	67	50	40	39	48	40	93	94	20	76	64	334	0	177
1900	234	153	0	0	70	28	191	110	68	55	41	43	50	42	96	98	20	77	66	348	0	181
1930	209	146	0	0	74	29	215	108	76	59	42	46	53	43	102	100	21	80	68	355	0	191
2000	205	157	0	0	78	34	221	101	93	67	51	50	67	49	131	114	26	94	79	416	0	221
2030	200	166	0	0	81	39	255	99	110	74	59	61	81	55	155	123	32	102	99	459	0	255
2100	198	175	0	0	78	40	293	106	114	71	69	63	85	54	163	122	34	104	112	457	0	267
2130	200	184	0	0	76	42	321	120	116	67	72	57	88	53	168	117	36	101	117	448	0	267
2200	203	191	0	0	81	47	319	119	110	60	69	53	85	47	161	105	35	92	117	408	0	256
2230	199	209	0	0	87	50	301	115	100	52	64	47	80	43	151	87	33	80	112	355	0	227
2300	213	263	0	0	86	47	269	107	83	42	55	39	64	34	126	67	29	63	100	276	0	198
2330	220	307	0	0	84	42	242	92	69	27	43	29	53	28	102	57	23	52	82	230	0	164

DO YOU WANT THE FLIGHT SCHEDULE OF EACH LINER? YES OR NO?
.yes

THE LINER FLIGHT SCHEDULE IS TABULATED FOR TWO DOUBLE ROUND TRIP.
THE FIRST DEPARTURE OF LINER FROM BOSTON PERFORMS WESTBOUND FLIGHT TO LOS ANGELES, THEN TURNING EASTBOUND TO BOSTON

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 800

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	1346	546	1142	442	954	354	926	426	916	416	903	403	842	342	833	333	823	323	800	300
1428	628	0	0	1617	917	1805	1205	1833	1333	1843	1343	1856	1356	1917	1417	1926	1426	1936	1436	1959	1459
0	0	147	1747	2343	1643	2155	1555	2127	1627	2117	1617	2104	1604	2043	1543	2034	1534	2024	1524	2001	1501
229	1829	0	0	418	2118	606	6	634	134	644	144	657	157	718	218	727	227	737	237	800	300

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 1000

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	1546	746	1342	642	1154	554	1126	626	1116	616	1103	603	1042	542	1033	533	1023	523	1000	500
1628	828	0	0	1817	1117	2005	1405	2033	1533	2043	1543	2056	1556	2117	1617	2126	1626	2136	1636	2159	1659
0	0	347	1947	143	1843	2355	1755	2327	1827	2317	1817	2304	1804	2243	1743	2234	1734	2224	1724	2201	1701
429	2029	0	0	618	2318	806	206	834	334	844	344	857	357	918	418	927	427	937	437	1000	500

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 1200

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	1746	946	1542	842	1354	754	1326	826	1316	816	1303	803	1242	742	1233	733	1223	723	1200	700
1828	1028	0	0	2017	1317	2205	1605	2233	1733	2243	1743	2256	1756	2317	1817	2326	1826	2336	1836	2359	1859
0	0	547	2147	343	2043	155	1955	127	2027	117	2017	104	2004	43	1943	34	1934	24	1924	1	1901
629	2229	0	0	810	118	1006	406	1034	534	1044	544	1057	557	1118	618	1127	627	1137	637	1200	700

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 1400

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	1946	1146	1742	1042	1554	954	1526	1026	1516	1016	1503	1003	1442	942	1433	933	1423	923	1400	900
2028	1228	0	0	2217	1517	5	1805	33	1933	43	1943	56	1956	117	2017	126	2026	136	2036	159	2059
0	0	747	2347	543	2243	355	2155	327	2227	317	2217	304	2204	243	2143	234	2134	224	2124	201	2101
829	29	0	0	1018	318	1206	606	1234	734	1244	744	1257	757	1318	818	1327	827	1337	837	1400	900

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 1600

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	2146	1346	1942	1242	1754	1154	1726	1226	1716	1216	1703	1203	1642	1142	1633	1133	1623	1123	1600	1100
2228	1428	0	0	17	1717	205	2005	233	2133	243	2143	256	2156	317	2217	326	2226	336	2236	359	2259
0	0	947	147	743	43	555	2355	527	27	517	17	504	4	443	2343	434	2334	424	2324	401	2301
1029	229	0	0	1218	518	1406	806	1434	934	1444	944	1457	957	1518	1018	1527	1027	1537	1037	1600	1100

FLIGHT SCHEDULE OF LINER FIRST DEPARTURE FROM BOSTON AT GMT 1800

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	2346	1546	2142	1442	1954	1354	1926	1426	1916	1416	1903	1403	1842	1342	1833	1333	1823	1323	1800	1300
28	1628	0	0	217	1917	405	2205	433	2333	443	2343	456	2356	517	17	526	26	536	36	559	59
0	0	1147	347	943	243	755	155	727	227	717	217	704	204	643	143	634	134	624	124	601	101
1229	429	0	0	1418	718	1606	1006	1634	1134	1644	1144	1657	1157	1718	1218	1727	1227	1737	1237	1800	1300

DO YOU WNAT THE DEMAND ALLOCATION OF EACH FLIGHT? YES OR NO
.yes

WESTBOUND FLIGHTS

BOS	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	800	1000	120	2	0	21	0
	2001	2201	120	619	0	701	0
	1000	1200	120	126	0	236	0
	2201	1	120	1068	0	448	0
	1200	1400	120	688	0	449	0
	1	201	120	657	0	348	0
	1400	1600	120	810	0	320	0
	201	401	120	514	0	156	0
	1600	1800	120	594	0	282	0
	401	601	120	193	0	7	0
	1800	2001	121	682	0	885	0
	601	800	119	7	0	2	0

WESTBOUND FLIGHTS

NYC	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	823	1023	120	7	0	99	13
	2024	2224	120	1133	229	1279	283
	1023	1223	120	291	43	747	132
	2224	24	120	1946	442	804	196
	1223	1423	120	1425	279	928	218
	24	224	120	1180	280	633	141
	1423	1623	120	1395	325	684	157
	224	424	120	963	216	282	75
	1623	1823	120	1044	236	671	142
	424	624	120	347	96	11	5
	1823	2024	121	1112	237	1612	328
	624	823	119	11	5	7	0

WESTBOUND FLIGHTS

PHI	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	833	1033	120	6	1	37	10
	2034	2234	120	271	83	269	84
	1033	1233	120	106	29	213	64
	2234	34	120	390	123	147	46
	1233	1433	120	348	105	183	57
	34	234	120	232	72	128	42
	1433	1633	120	277	86	137	42
	234	434	120	177	58	44	15
	1633	1833	120	219	68	152	46
	434	634	120	48	18	0	0
	1833	2034	121	254	76	394	118
	634	833	119	0	0	6	1

WESTBOUND FLIGHTS

WAS	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	842	1042	120	8	9	49	53
	2043	2243	120	337	395	336	389
	1042	1242	120	135	155	262	319
	2243	43	120	488	562	188	213
	1242	1442	120	428	509	229	263
	43	243	120	292	336	159	188
	1442	1642	120	346	399	170	195
	243	443	120	220	257	53	61
	1642	1842	120	274	315	191	222
	443	643	120	60	68	0	0
	1842	2043	121	317	366	490	573
	643	842	119	0	0	8	9

WESTBOUND FLIGHTS

PIT	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	903	1103	120	5	12	30	52
	2104	2304	120	150	220	134	193
	1103	1303	120	78	131	124	190
	2304	104	120	191	271	75	109
	1303	1503	120	189	282	92	134
	104	304	120	120	174	63	87
	1503	1703	120	140	204	71	101
	304	504	120	82	113	16	22
	1703	1903	120	117	169	84	122
	504	704	120	16	22	0	0
	1903	2104	121	141	209	226	337
	704	903	119	0	0	5	12

WESTBOUND FLIGHTS

CLE	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	916	1116	120	4	9	26	42
	2117	2317	120	151	162	143	143
	1116	1316	120	68	105	118	154
	2317	117	120	206	203	81	87
	1316	1516	120	188	229	98	109
	117	317	120	126	140	66	71
	1516	1716	120	149	165	74	84
	317	517	120	90	93	22	19
	1716	1916	120	120	140	86	98
	517	717	120	22	19	0	0
	1916	2117	121	144	164	223	248
	717	916	119	0	0	4	9

WESTBOUND FLIGHTS

DET	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	926	1126	120	3	22	30	83
	2127	2327	120	176	292	167	245
	1126	1326	120	79	201	140	245
	2327	127	120	241	345	97	147
	1326	1526	120	223	366	117	177
	127	327	120	150	234	78	107
	1526	1726	120	180	267	103	142
	327	527	120	107	140	25	21
	1726	1926	120	158	236	99	170
	527	727	120	25	21	0	0
	1926	2127	121	168	297	262	453
	727	926	119	0	0	3	22

WESTBOUND FLIGHTS

CHI	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	954	1154	120	8	6	49	69
	2155	2355	120	315	722	302	781
	1154	1354	120	136	209	257	514
	2355	155	120	433	1164	166	462
	1354	1554	120	403	910	203	565
	155	355	120	263	699	143	383
	1554	1754	120	309	844	154	401
	355	555	120	193	550	46	155
	1754	1954	120	250	628	178	418
	555	755	120	48	179	0	0
	1954	2155	121	295	691	462	1033
	755	954	119	0	0	8	6

WESTBOUND FLIGHTS

DEN	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1142	1342	120	11	33	42	116
	2343	143	120	113	241	86	182
	1342	1542	120	98	239	93	201
	143	343	120	122	257	57	120
	1542	1742	120	137	295	66	137
	343	543	120	89	189	35	75
	1742	1942	120	99	207	55	119
	543	743	120	45	99	5	10
	1942	2142	120	93	198	68	138
	743	943	120	5	10	0	0
	2142	2343	121	124	254	179	378
	943	1142	119	0	0	12	36

WESTBOUND FLIGHTS

SFO	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1346	1546	120	279	172	498	333
	147	347	120	230	303	123	217
	1546	1746	120	828	521	521	262
	347	547	120	186	342	130	171
	1746	1946	120	810	398	421	202
	547	747	120	207	229	116	44
	1946	2146	120	655	330	408	235
	747	947	120	154	46	0	0
	2146	2346	120	652	400	439	363
	947	1147	120	0	0	0	0
	2346	147	121	710	613	467	542
	1147	1346	119	49	13	359	207

EASTBOUND FLIGHTS

LAX	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1428	1628	120	447	436	611	677
	229	429	120	125	512	59	380
	1628	1828	120	982	1004	626	480
	429	629	120	76	605	70	286
	1828	2028	120	988	726	531	379
	629	829	120	128	376	121	63
	2028	2228	120	830	632	502	462
	829	1029	120	121	63	0	0
	2228	28	120	807	802	525	757
	1029	1229	120	0	0	44	10
	28	229	121	785	1235	327	949
	1229	1428	119	141	51	593	528

EASTBOUND FLIGHTS

DEN	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1617	1817	120	162	73	158	69
	418	618	120	24	32	3	4
	1817	2017	120	259	109	187	77
	618	818	120	4	4	1	0
	2017	2217	120	307	136	196	109
	818	1018	120	1	0	0	0
	2217	17	120	326	182	205	104
	1018	1218	120	7	2	58	25
	17	217	120	309	156	125	74
	1218	1418	120	125	60	161	83
	217	418	121	174	108	54	60
	1418	1617	119	276	142	268	125

EASTBOUND FLIGHTS

CHI	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1805	2005	120	450	265	531	264
	606	806	120	0	6	0	0
	2005	2205	120	932	416	786	292
	806	1006	120	0	0	22	20
	2205	5	120	1221	460	583	220
	1006	1206	120	102	69	338	148
	5	205	120	858	306	402	80
	1206	1406	120	681	280	631	264
	205	405	120	598	100	217	21
	1406	1606	120	949	410	459	229
	405	606	121	259	21	4	12
	1606	1805	119	712	377	697	413

EASTBOUND FLIGHTS

DET	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1833	2033	120	173	134	241	170
	634	834	120	0	0	0	0
	2033	2233	120	413	274	268	145
	834	1034	120	8	13	46	51
	2233	33	120	385	200	148	63
	1034	1234	120	125	119	226	159
	33	233	120	234	98	126	43
	1234	1434	120	356	252	184	146
	233	433	120	172	62	40	20
	1434	1634	120	279	229	138	130
	433	634	121	42	25	0	0
	1634	1833	119	223	206	265	209

EASTBOUND FLIGHTS

CLE	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1843	2043	120	102	105	131	134
	644	844	120	0	0	0	0
	2043	2243	120	236	225	169	128
	844	1044	120	3	10	23	34
	2243	43	120	245	181	93	63
	1044	1244	120	63	83	136	123
	43	243	120	145	97	81	46
	1244	1444	120	218	199	115	115
	243	443	120	111	65	28	19
	1444	1644	120	175	178	85	95
	443	644	121	32	23	0	0
	1644	1843	119	136	152	157	162

EASTBOUND FLIGHTS

PIT	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1856	2056	120	124	103	174	125
	657	857	120	0	0	0	0
	2056	2256	120	303	205	209	116
	857	1057	120	4	10	27	37
	2256	56	120	299	164	113	60
	1057	1257	120	79	87	169	119
	56	256	120	179	90	100	42
	1257	1457	120	276	190	145	109
	256	456	120	137	59	34	15
	1457	1657	120	218	167	104	92
	456	657	121	38	19	0	0
	1657	1856	119	167	146	192	160

EASTBOUND FLIGHTS

WAS	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1917	2117	120	263	255	383	302
	718	918	120	0	0	5	13
	2117	2317	120	631	471	357	206
	918	1118	120	24	49	100	134
	2317	117	120	503	288	203	115
	1118	1318	120	250	281	352	302
	117	317	120	325	172	162	86
	1318	1518	120	523	469	249	261
	317	517	120	211	120	39	41
	1518	1718	120	378	402	194	211
	517	718	121	39	41	0	0
	1718	1917	119	322	339	400	392

EASTBOUND FLIGHTS

PHI	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1926	2126	120	54	204	79	253
	727	927	120	0	0	1	9
	2126	2326	120	132	400	79	189
	927	1127	120	4	33	19	99
	2326	126	120	111	265	42	109
	1127	1327	120	49	213	74	245
	126	326	120	68	167	36	82
	1327	1527	120	111	376	54	202
	326	526	120	47	112	10	31
	1527	1727	120	82	311	42	161
	526	727	121	10	31	0	0
	1727	1926	119	69	263	83	314

EASTBOUND FLIGHTS

NYC	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1936	2136	120	196	1000	278	1134
	737	937	120	0	0	4	103
	2136	2336	120	451	1719	238	683
	937	1137	120	21	284	85	638
	2336	136	120	335	975	144	446
	1137	1337	120	204	1284	242	1095
	136	336	120	229	690	104	310
	1337	1537	120	359	1682	171	890
	336	536	120	135	421	18	82
	1537	1737	120	258	1351	139	743
	536	737	121	18	82	0	0
	1737	1936	119	232	1223	294	1515

EASTBOUND FLIGHTS

BOS	FLT1	FLT2	SEP.TIME	OB#1	IN#1	OB#2	IN#2
	1959	2159	120	0	539	0	661
	800	1000	120	0	4	0	33
	2159	2359	120	0	1030	0	475
	1000	1200	120	0	163	0	256
	2359	159	120	0	674	0	302
	1200	1400	120	0	721	0	477
	159	359	120	0	476	0	204
	1400	1600	120	0	874	0	361
	359	559	120	0	272	0	41
	1600	1800	120	0	672	0	308
	559	800	121	0	41	0	4
	1800	1959	119	0	656	0	718

WOULD YOU LIKE TO LOAD SOME EXTRA PASSENGERS BETWEEN ANY CITY PAIR? YES OR NO
.no
DO YOU WANT THE COMBINED SCHEDULE FOR BOTH DIRECTION? YES OR NO
.yes

SCHEDULE OF WESTBOUND FLIGHT AT EACH HUB

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	1316	546	1142	442	954	354	926	426	916	416	903	403	842	342	833	333	823	323	800	300
0	0	147	1747	2343	1643	2155	1555	2127	1627	2117	1617	2104	1604	2043	1543	2034	1534	2024	1524	2001	1501
0	0	1546	746	1342	642	1154	554	1126	626	1116	616	1103	603	1042	542	1033	533	1023	523	1000	500
0	0	347	1947	143	1843	2355	1755	2327	1827	2317	1817	2304	1804	2243	1743	2234	1734	2224	1724	2201	1701
0	0	1746	946	1542	842	1354	754	1326	826	1316	816	1303	803	1242	742	1233	733	1223	723	1200	700
0	0	547	2147	343	2043	155	1955	127	2027	117	2017	104	2004	43	1943	34	1934	24	1924	1	1901
0	0	1946	1146	1742	1042	1554	954	1526	1026	1516	1016	1503	1003	1442	942	1433	933	1423	923	1400	900
0	0	747	2347	543	2243	355	2155	327	2227	317	2217	304	2204	243	2143	234	2134	224	2124	201	2101
0	0	2146	1346	1942	1242	1754	1154	1726	1226	1716	1216	1703	1203	1642	1142	1633	1133	1623	1123	1600	1100
0	0	947	147	743	43	555	2355	527	27	517	17	504	4	443	2343	434	2334	424	2324	401	2301
0	0	2346	1546	2142	1442	1954	1354	1926	1426	1916	1416	1903	1403	1842	1342	1833	1333	1823	1323	1800	1300
0	0	1147	347	943	243	755	155	727	227	717	217	704	204	643	143	634	134	624	124	601	101

SCHEDULE OF EASTBOUND FLIGHT AT EACH HUB

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
1428	628	0	0	1617	917	1805	1205	1833	1333	1843	1343	1856	1356	1917	1417	1926	1426	1936	1436	1959	1459
229	1829	0	0	418	2118	606	6	634	134	644	144	657	157	718	218	727	227	737	237	800	300
1628	828	0	0	1817	1117	2005	1405	2033	1533	2043	1543	2056	1556	2117	1617	2126	1626	2136	1636	2159	1659
429	2029	0	0	618	2318	806	206	834	334	844	344	857	357	918	418	927	427	937	437	1000	500
1828	1028	0	0	2017	1317	2205	1605	2233	1733	2243	1743	2256	1756	2317	1817	2326	1826	2336	1836	2359	1859
629	2229	0	0	818	118	1006	406	1034	534	1044	544	1057	557	1118	618	1127	627	1137	637	1200	700
2028	1228	0	0	2217	1517	5	1805	33	1933	43	1943	56	1956	117	2017	126	2026	136	2036	159	2059
829	29	0	0	1018	318	1206	606	1234	734	1244	744	1257	757	1318	818	1327	827	1337	837	1400	900
2228	1428	0	0	17	1717	205	2005	233	2133	243	2143	256	2156	317	2217	326	2226	336	2236	359	2259
1029	229	0	0	1218	518	1406	806	1434	934	1444	944	1457	957	1518	1018	1527	1027	1537	1037	1600	1100
28	1628	0	0	217	1917	405	2205	433	2333	443	2343	456	2356	517	17	526	26	536	36	559	59
1229	429	0	0	1418	718	1606	1006	1634	1134	1644	1144	1657	1157	1718	1218	1727	1227	1737	1237	1800	1300

WOULD YOU LIKE TO HAVE TRAFFIC LOADS? YES OR NO
.yes

THE TABULATION OF WESTBOUND FLIGHT IS ARRANGED BY THREE NUMBERS UNDER THE TITLE OF EACH HUB.
THE THREE NUMBERS ARE: OUTBOUND PASSENGER INBOUND PASSENGER
FLY OVER PASSENGER

WESTBOUND TRAFFIC LOAD OVER HUBS

LAX			SFO			DEN			CHI			DET			CLE			PIT			WAS			PHI			NYC			BOS		
0	359	359	12	12	8	8	3	3	4	4	6	5	12	8	9	6	1	7	0	2	0
0			0			0			0			0			0			1			5			8			2			0		
0	1190	467	542	179	378	462	1033	262	453	223	248	226	337	490	573	394	118	1612	328	885	0
0			723			1086			1002			1773			2003			2025			1872			2051			557			0		
0	828	828	98	98	146	136	209	79	201	68	105	78	131	135	155	106	29	291	43	126	0
0			0			0			10			140			273			300			296			345			83			0		
0	1562	186	342	122	257	433	1164	241	345	206	203	191	271	488	562	390	123	1946	442	1068	0
0			1376			1596			1420			2343			2402			2494			2277			2449			626			0		
0	1466	810	398	137	295	403	910	223	366	188	229	189	282	428	509	348	105	1425	279	688	0
0			656			917			809			1496			1674			1714			1568			1729			409			0		
0	963	207	229	89	189	263	699	150	234	126	140	120	174	292	336	232	72	1180	280	657	0
0			756			896			822			1371			1479			1499			1381			1485			377			0		
0	1533	655	330	99	207	309	844	180	267	149	165	140	204	346	399	277	86	1395	325	810	0
0			878			1109			1007			1671			1789			1814			1672			1794			485			0		
0	973	154	46	45	99	193	550	107	140	90	93	82	113	220	257	177	58	963	216	514	0
0			819			820			726			1169			1219			1230			1123			1203			298			0		
0	1131	652	400	93	198	250	628	158	236	120	140	117	169	274	315	219	68	1044	236	594	0
0			479			786			734			1204			1320			1343			1238			1334			358			0		
0	331	0	0	5	10	48	179	25	21	22	19	16	22	60	68	48	18	347	96	193	0
0			331			326			288			442			441			444			406			426			97			0		
0	1040	710	613	124	254	295	691	168	297	144	164	141	209	317	366	254	76	1112	237	682	0
0			330			819			778			1301			1454			1477			1369			1481			445			0		
0	49	49	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	5	7	0
0			0			13			13			13			13			13			13			13			2			0		

THE LIST IS TABULATED AS FOLLOWING:

OUTBOUND PASSENGER INBOUND PASSENGER
FLY OVER PASSENGER

EASTBOUND TRAFFIC LOAD OVER HUBS

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
593	0	0	0	268	125	697	413	265	209	157	162	192	160	400	392	83	314	294	080	0	294
	0		0		468		323		811		914		911		711		797		0		0
327	0	0	0	54	60	4	12	0	0	0	0	0	0	0	0	0	0	0	0	0	313
	0		0		267		309		313		313		313		313		313		313		0
982	0	0	0	259	109	932	416	413	274	236	225	303	205	631	471	132	400	451	1719	0	520
	0		0		873		716		1374		1562		1593		1425		1656		69		0
76	0	0	0	4	4	0	0	8	13	3	10	4	10	24	49	4	33	21	4	0	21
	0		0		72		76		63		61		54		9		0		0		0
988	0	0	0	307	136	1221	460	385	200	245	181	299	164	503	288	111	265	335	975	0	1725
	0		0		852		699		1720		1924		2005		2016		2254		1390		0
128	0	0	0	1	0	102	69	125	119	63	83	79	87	250	140	49	213	204	86	0	204
	0		0		128		60		43		85		61		0		37		0		0
830	0	0	0	326	182	858	306	234	98	145	97	179	90	325	172	68	167	229	690	0	1392
	0		0		648		668		1428		1565		1620		1627		1785		1163		0
121	0	0	0	7	2	681	126	356	252	218	199	276	190	523	469	111	376	359	679	0	359
	0		0		119		0		429		586		614		421		568		0		0
807	0	0	0	309	156	598	100	172	62	111	65	137	59	211	120	47	112	135	421	0	1432
	0		0		651		860		1396		1503		1555		1572		1671		1297		0
0	0	0	0	125	0	949	125	279	229	175	178	218	167	378	402	82	311	258	794	0	258
	0		0		0		0		720		821		829		645		712		0		0
785	0	0	0	174	108	259	21	42	25	32	23	38	19	39	41	10	31	18	82	0	1047
	0		0		677		830		1064		1083		1096		1093		1101		1029		0
141	0	0	0	276	141	712	276	223	206	136	152	167	146	322	339	69	263	232	523	0	232
	0		0		0		0		506		577		567		395		454		0		0

DO YOU WANT THE SEGMENT LOAD FACTOR? YES OR NO
.yes

THE FOLLOWING OUTPUT IS TABULATED AS:
ONBOARD PAX LOAD FACTOR
LOCAL DEPARTURE TIME

WESTBOUND SEGMENT LOAD

SFO-LAX	DEN-SFO	CHI-DEN	DET-CHI	CLE-DET	PIT-CLE	WAS-PIT	PHI-WAS	NYC-PHI	BOS-NYC
359 0.11	12 0.00	8 0.00	3 0.00	4 0.00	6 0.00	13 0.00	14 0.00	9 0.00	2 0.00
546	442	354	426	416	403	342	333	323	300
1190 0.37	1265 0.40	1464 0.46	2035 0.64	2226 0.70	2251 0.70	2362 0.74	2445 0.76	2169 0.68	885 0.28
1747	1643	1555	1627	1617	1604	1543	1534	1524	1501
828 0.26	98 0.03	146 0.05	219 0.07	341 0.11	378 0.12	431 0.13	451 0.14	374 0.12	126 0.04
746	642	554	626	616	603	542	533	523	500
1562 0.49	1718 0.54	1853 0.58	2584 0.81	2688 0.84	2685 0.84	2765 0.86	2839 0.89	2572 0.80	1068 0.33
1947	1843	1755	1827	1817	1804	1743	1734	1724	1701
1466 0.46	1054 0.33	1212 0.38	1719 0.54	1862 0.58	1903 0.59	1996 0.62	2077 0.65	1834 0.57	688 0.21
946	842	754	826	816	803	742	733	723	700
963 0.30	985 0.31	1085 0.34	1521 0.48	1605 0.50	1619 0.51	1673 0.52	1717 0.54	1557 0.49	657 0.21
2147	2043	1955	2027	2017	2004	1943	1934	1924	1901
1533 0.48	1208 0.38	1316 0.41	1851 0.58	1938 0.61	1954 0.61	2018 0.63	2071 0.65	1880 0.59	810 0.25
1146	1042	954	1026	1016	1003	942	933	923	900
973 0.30	865 0.27	919 0.29	1276 0.40	1309 0.41	1312 0.41	1343 0.42	1380 0.43	1261 0.39	514 0.16
2347	2243	2155	2227	2217	2204	2143	2134	2124	2101
1131 0.35	879 0.27	984 0.31	1362 0.43	1440 0.45	1460 0.46	1512 0.47	1553 0.49	1402 0.44	594 0.19
1346	1242	1154	1226	1216	1203	1142	1133	1123	1100
331 0.10	331 0.10	336 0.10	467 0.15	463 0.14	460 0.14	466 0.15	474 0.15	444 0.14	193 0.06
147	43	2355	27	17	4	2343	2334	2324	2301
1040 0.32	943 0.29	1073 0.34	1469 0.46	1598 0.50	1618 0.51	1686 0.53	1735 0.54	1557 0.49	682 0.21
1546	1442	1354	1426	1416	1403	1342	1333	1323	1300
49 0.02	13 0.00	13 0.00	13 0.00	13 0.00	13 0.00	13 0.00	13 0.00	13 0.00	7 0.00
347	243	155	227	217	204	143	134	124	101

EASTBOUND SEGMENT LOAD

LAX-DEN	DEN-CHI	CHI-DET	DET-CLE	CLE-PIT	PIT-WAS	WAS-PHI	PHI-NYC	NYC-BOS
593 0.19	736 0.23	1020 0.32	1076 0.34	1071 0.33	1103 0.34	1111 0.35	880 0.27	294 0.09
628	917	1205	1333	1343	1356	1417	1426	1436
327 0.10	321 0.10	313 0.10	313 0.10	313 0.10	313 0.10	313 0.10	313 0.10	313 0.10
1829	2118	6	134	144	157	218	227	237
982 0.31	1132 0.35	1648 0.51	1787 0.56	1798 0.56	1896 0.59	2056 0.64	1788 0.56	520 0.16
828	1117	1405	1533	1543	1556	1617	1626	1636
76 0.02	76 0.02	76 0.02	71 0.02	64 0.02	58 0.02	33 0.01	4 0.00	21 0.01
2029	2318	206	334	344	357	418	427	437
988 0.31	1159 0.36	1920 0.60	2105 0.66	2169 0.68	2304 0.72	2519 0.79	2365 0.74	1725 0.54
1028	1317	1605	1733	1743	1756	1817	1826	1836
128 0.04	129 0.04	162 0.05	168 0.05	148 0.05	140 0.04	250 0.08	86 0.03	204 0.06
2229	118	406	534	544	557	618	627	637
830 0.26	974 0.30	1526 0.48	1662 0.52	1710 0.53	1799 0.56	1952 0.61	1853 0.58	1392 0.43
1228	1517	1805	1933	1943	1956	2017	2026	2036
121 0.04	126 0.04	681 0.21	785 0.25	804 0.25	890 0.28	944 0.29	679 0.21	359 0.11
29	318	606	734	744	757	818	827	837
807 0.25	960 0.30	1458 0.46	1568 0.49	1614 0.50	1692 0.53	1783 0.56	1718 0.54	1432 0.45
1428	1717	2005	2133	2143	2156	2217	2226	2236
0 0.0	125 0.04	949 0.30	999 0.31	996 0.31	1047 0.33	1023 0.32	794 0.25	258 0.08
229	518	806	934	944	957	1018	1027	1037
785 0.25	851 0.27	1089 0.34	1106 0.35	1115 0.35	1134 0.35	1132 0.35	1111 0.35	1047 0.33
1628	1917	2205	2333	2343	2356	17	26	36
141 0.04	276 0.09	712 0.22	729 0.23	713 0.22	734 0.23	717 0.22	523 0.16	232 0.07
429	718	1006	1134	1144	1157	1218	1227	1237

*** OVERALL LOAD FACTOR = 0.26
WANT TO HAVE THE DAILY SCHEDULING MAP OVER STATIONTYES OR NO?
•Yes

SCHEDULE OF WESTBOUND FLIGHT AT EACH HUB

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
0	0	147	1747	143	1843	155	1955	127	2027	117	2017	104	2004	43	1943	34	1934	24	1924	1	1901
0	0	347	1947	343	2043	355	2155	327	2227	317	2217	304	2204	243	2143	234	2134	224	2124	201	2101
0	0	547	2147	543	2243	555	2355	527	27	517	17	504	4	443	2343	434	2334	424	2324	401	2301
0	0	747	2347	743	43	755	155	727	227	717	217	704	204	643	143	634	134	624	124	601	101
0	0	947	147	943	243	954	354	926	426	916	416	903	403	842	342	833	333	823	323	800	300
0	0	1147	347	1142	442	1154	554	1126	626	1116	616	1103	603	1042	542	1033	533	1023	523	1000	500
0	0	1346	546	1342	642	1354	754	1326	826	1316	816	1303	803	1242	742	1233	733	1223	723	1200	700
0	0	1546	746	1542	842	1554	954	1526	1026	1516	1016	1503	1003	1442	942	1433	93	1423	923	1400	900
0	0	1746	946	1742	1042	1754	1154	1726	1226	1716	1216	1703	1203	1642	1142	1633	1133	1623	1123	1600	1100
0	0	1946	1146	1942	1242	1954	1354	1926	1426	1916	1416	1903	1403	1842	1342	1833	1333	1823	1323	1800	1300
0	0	2146	1346	2142	1442	2155	1555	2127	1627	2117	1617	2104	1604	2043	1543	2034	1534	2024	1524	2001	1501
0	0	2346	1546	2343	1643	2355	1755	2327	1827	2317	1817	2304	1804	2243	1743	2234	1734	2224	1724	2201	1701

SCHEDULE OF EASTBOUND FLIGHT AT EACH HUB

LAX		SFO		DEN		CHI		DET		CLE		PIT		WAS		PHI		NYC		BOS	
GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC	GMT	LOC
28	1628	0	0	17	1717	5	1805	33	1933	43	1943	56	1956	117	2017	126	2026	136	2036	159	2059
229	1829	0	0	217	1917	205	2005	233	2133	243	2143	256	2156	317	2217	326	2226	336	2236	359	2259
429	2029	0	0	418	2118	405	2205	433	2333	443	2343	456	2356	517	17	526	26	536	36	559	59
629	2229	0	0	618	2318	606	6	634	134	644	144	657	157	718	218	727	227	737	237	800	300
829	29	0	0	818	118	806	206	834	334	844	344	857	357	918	418	927	427	937	437	1000	500
1029	229	0	0	1018	318	1006	406	1034	534	1044	544	1057	557	1118	618	1127	627	1137	637	1200	700
1229	429	0	0	1218	518	1206	606	1234	734	1244	744	1257	757	1318	818	1327	827	1337	837	1400	900
1428	628	0	0	1418	718	1406	806	1434	934	1444	944	1457	957	1518	1018	1527	1027	1537	1037	1600	1100
1628	828	0	0	1617	917	1606	1006	1634	1134	1644	1144	1657	1157	1718	1218	1727	1227	1737	1237	1800	1300
1828	1028	0	0	1817	1117	1805	1205	1833	1333	1843	1343	1856	1356	1917	1417	1926	1426	1936	1436	1959	1459
2028	1228	0	0	2017	1317	2005	1405	2033	1533	2043	1543	2056	1556	2117	1617	2126	1626	2136	1636	2159	1659
2228	1428	0	0	2217	1517	2205	1605	2233	1733	2243	1743	2256	1756	2317	1017	2326	1826	2336	1836	2359	1859

FIRST DEPARTURE OF EACH LINER FROM BOSTON

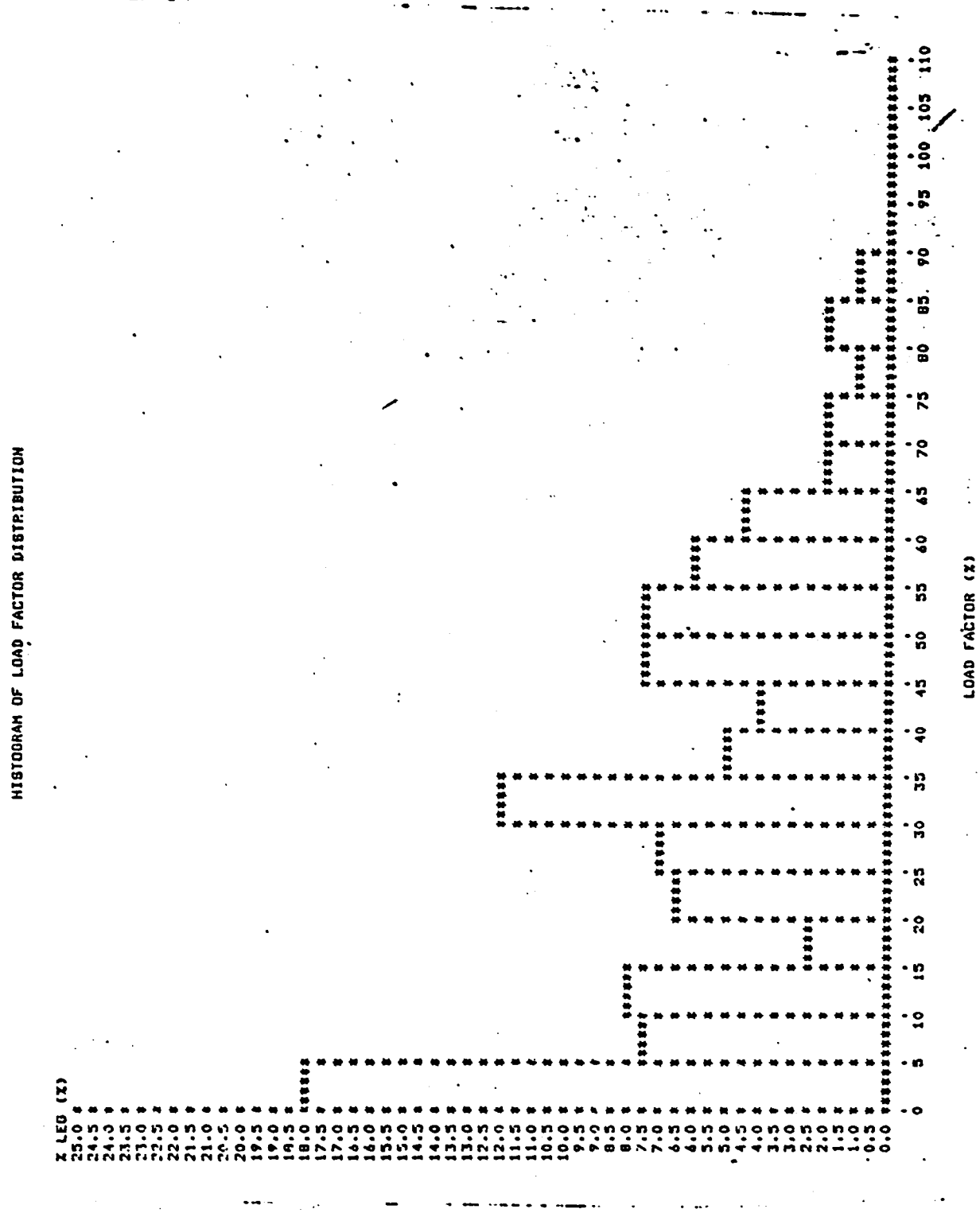
800
1000
1200
1400
1600
1800

DO YOU WANT THE LOAD FACTOR DISTRIBUTION? YES OR NO
.yes

PLEASE ENTER ONE CHARACTER OR SYMBOL WHICH YOU WOULD LIKE TO PLOT ON THE DISTRIBUTION GRAPH.
AND PRECEDED IT BY A BLANK AND A PERIOD (.)
. .*

LOAD FACTOR DISTRIBUTION TOTAL LEG=228

L.F.	%LEG	#LEG
0.0 -0.05	0.180	41
0.05-0.10	0.075	17
0.10-0.15	0.079	18
0.15-0.20	0.022	5
0.20-0.25	0.061	14
0.25-0.30	0.066	15
0.30-0.35	0.118	27
0.35-0.40	0.048	11
0.40-0.45	0.039	9
0.45-0.50	0.070	16
0.50-0.55	0.070	16
0.55-0.60	0.057	13
0.60-0.65	0.044	10
0.65-0.70	0.018	4
0.70-0.75	0.018	4
0.75-0.80	0.009	2
0.80-0.85	0.018	4
0.85-0.90	0.009	2
0.90-0.95	0.0	0
0.95-1.00	0.0	0
1.00-1.05	0.0	0
1.05-1.10	0.0	0


HISTOGRAM OF LOAD FACTOR DISTRIBUTION
% LEG (%)
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24.5
24.0
23.5
23.0
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22.0
21.5
21.0
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0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110
LOAD FACTOR (%)

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16. Abstract

The ability of the Aerial Relay System to handle the U.S. transcontinental large hub passenger flow is analyzed with a flexible, interactive computer model. The model incorporates city-pair time-of-day demand and a demand allocation function which assigns passengers to their preferred flights.

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